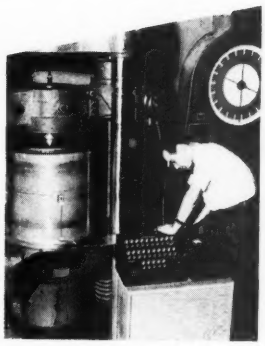
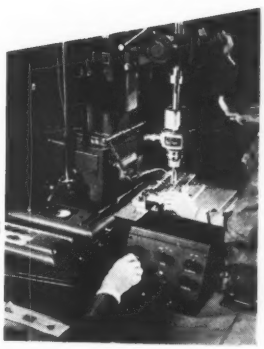
AUGUST 27, 1951

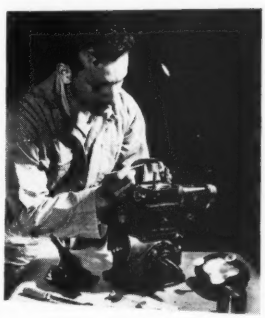
STEEL

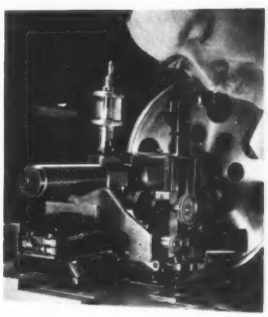
THE WEEKLY MAGAZINE OF METALWORKING





RESEARCH MANAGEMENT





Get the most from your development dollars. Your laboratories need able administrators as well as skilled engineers —*page 54*

TURBINE BLADE MATERIALS
—*Research Accelerates, p. 72*

AIR-ELECTRIC GAGING
—*Self-Controlling Machine Tools, p. 80*

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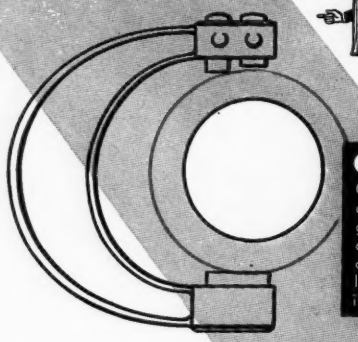
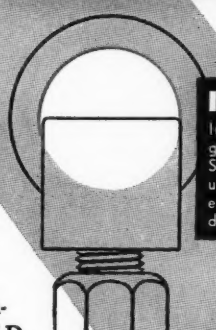
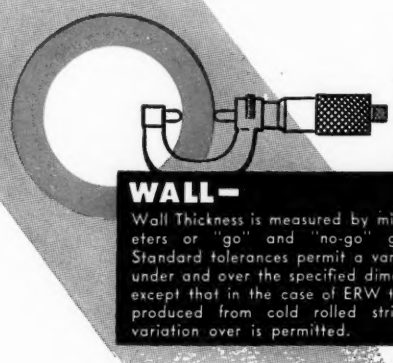
let's take a CLOSER LOOK at tubing dimensions



O. D.—
Outside Diameter is measured generally by micrometers or "go" and "no-go" gages. Standard tolerances permit a fraction over and under the specified dimension except that in certain seamless cold-drawn sizes no variation under is permitted.



I. D.—
Inside Diameter is measured by plug gages or special measuring devices. Standard tolerances permit a fraction under and over the specified dimensions except that in certain seamless cold drawn sizes no variation over is permitted.



WALL—
Wall Thickness is measured by micrometers or "go" and "no-go" gages. Standard tolerances permit a variation under and over the specified dimension except that in the case of ERW tubing produced from cold rolled strip no variation over is permitted.

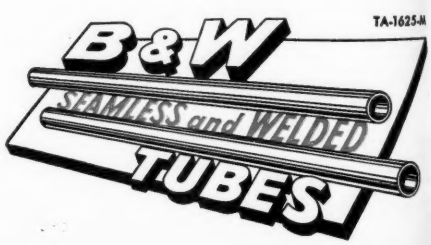
In addition to length, round tubing has three dimensions — outside diameter (O.D.), inside diameter (I.D.) and wall thickness.

Mechanical tubing is commonly specified to outside diameter and wall thickness. If inside diameter is the more important dimension, seamless cold drawn tubing is specified to O.D. and I.D. dimensions, and ERW carbon steel tubing is specified to I.D. and O.D., or, I.D. and wall dimension. Tolerances in any tube are applicable to two cross-sectional dimensions. Thus, if outside diameter and wall thickness are specified, the inside diameter may not necessarily conform to *published tolerances, and if inside and outside diameters are specified, wall thicknesses may not necessarily conform to *published tolerances**.**

For help in finding the tubing best suited to your particular use, consult Mr. Tubes — your B&W Tube Co. representative. He may help you uncover new economies in the purchase of mechanical tubing.

***Write for B&W Tube Co. Bulletins TB 333 "ERW Carbon Steel Mechanical Tubing" and TDC 115 "Tolerances — Round Seamless Carbon and Alloy Steel Mechanical Tubing."**

TA-1625-M



THE BABCOCK & WILCOX TUBE COMPANY

***Executive Offices:* Beaver Falls, Pa.**

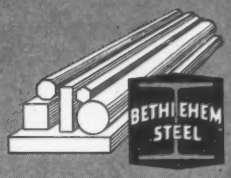
General Offices & Plants

Beaver Falls, Pa.— Seamless Tubing; Welded Stainless Steel Tubing

Alliance, Ohio — Welded Carbon Steel Tubing

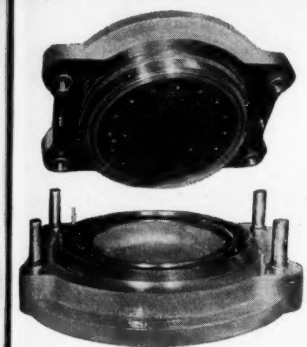
Sales Offices: Beaver Falls, Pa. • Boston 16, Mass. • Chicago 3, Ill. • Cleveland 14, Ohio
Denver, Colo. • Detroit 26, Mich. • Houston 2, Texas • Los Angeles 15, Calif.
New York 16, N. Y. • Philadelphia 2, Pa. • St. Louis 1, Mo. • San Francisco 3, Calif.
Syracuse 2, N. Y. • Toronto, Ontario • Tulsa 3, Okla.

Tool Steel Topics



BETHLEHEM STEEL COMPANY, BETHLEHEM, PA.

In the Pacific Coast Bethlehem products are sold by Bethlehem Pacific Coast Steel Corporation. *Export Distributor:* Bethlehem Steel Export Corporation



H5 solved a distortion problem and increased the duction of large dies for blanking tank heads.

-H5 Cures Distortion f Large Blanking Dies

manufacturer of water-heaters couldn't em to prevent an excessive amount of istortion in large-diameter forged rings f oil-hardening steel for blanking out ads for water tanks. Our distributor ecommended A-H5 (5 pct chrome, air-rdening) tool steel because of its reater resistance to distortion . . . and s added features of high wear-resistance d toughness.

After A-H5 had been used for one ar, the records showed that besides king the distortion problem, the air-rdening grade had made possible a nice crease in production . . . and the cost of e tool steel was no greater than before.

A-H5 is an economical, general-pur-se grade—especially for tools and dies at call for long wear, high resistance distortion, and for extra safety in rdening.

Our Tool Steel Engineer Says:

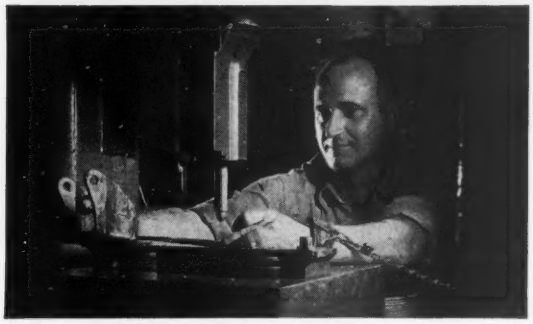
There are good reasons for annealing tool steel

ost tool steel bars are furnished in the nealed condition. The annealing is done r two reasons:

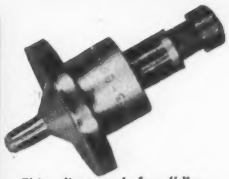
1. To remove the stresses in the as-rolled or as-forged bars which could otherwise lead to cracking.
2. To produce the lowest possible hardness consistent with the best machinability.

uring the annealing operation, care ust be used to avoid excessive scaling d decarburization. The bell-type, con-olled-atmosphere furnaces used in our ol-steel mill are ideal for this purpose. e can far surpass the results obtained ith ordinary annealing equipment.

TOOLS MADE OF 67 CHISEL WITHSTAND BRUTAL SHOCK



67 Chisel, used in this punch, absorbs plenty of shock in the forming of parts from 0.185-in. sheet steel.



This die, used for "dimpling" aluminum aircraft skin, is made of 67 Chisel and is heated electrically to 600 F so as to stress-relieve the aluminum during the operation.

Made of 67 Chisel, this intricate master hob is used to hob a mold cavity for die-casting a multiple gear.

As its name implies, 67 Chisel is primarily for shock tools . . . but chisels account for only a small proportion of its many applications. This chrome-tungsten steel has high shock-resistance, good red-hardness, and it is readily carburized for high wear-resistance.

67 Chisel is first choice for master hobs used in hobbing molds for plasties and die-casting work. It's often used for punches, swaging dies, calking and beading tools . . . heavy shear blades for cold work and for hot work up to 1000 F . . . and various shock and hot-work jobs such as studs and bolts for elevated temperatures, drop-forge die inserts, piercers, headers, and forming tools.

Carburizing produces a high surface-hardness that's reinforced by a tough, shock-resisting core. 67 Chisel has very high impact properties—about 175 ft-lb. That's really tough!

67 Chisel is a mighty versatile grade to keep in mind when you need tools that will stand up under heavy shock or high pressures; and it's especially recommended for tools having deep recesses, corners, slender shanks—wherever great strength is needed. You'll find it's an easy steel to machine and heat-treat.

67 Chisel is stocked in many sizes and sections in our mill depot . . . also by distributors of Bethlehem Tool Steels in principal cities.

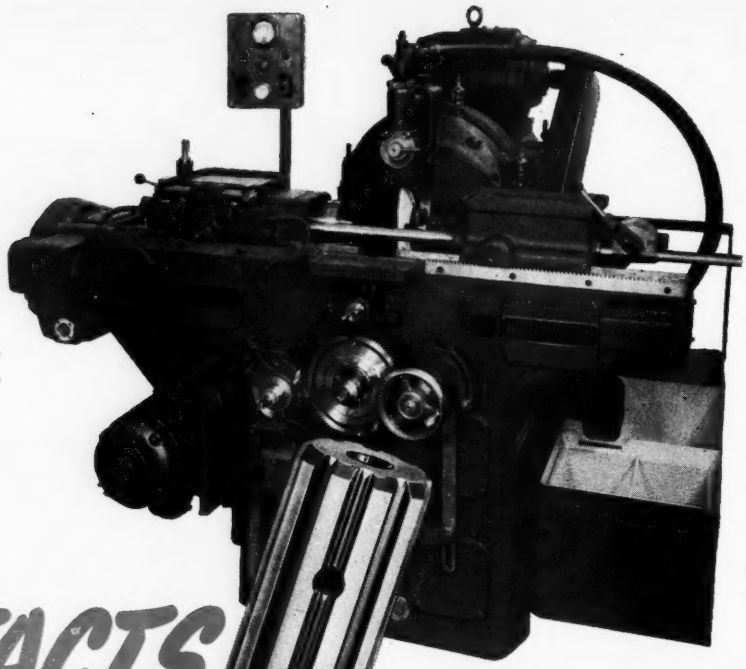
Choose Tool Steel To Fit the Job

Shop men sometimes have deep-rooted ideas about tool steel that just aren't based on facts. The other day, for example, we saw a milling cutter made for a rather unusual machining job. The toolmaker had selected high-speed steel, figuring it would last longest because it was the most expensive and the most highly alloyed grade.

He made a poor choice, for the high-speed cutter produced only 18 pieces before it failed. One of our tool-steel engineers was called on to explain this disappointing performance. He recommended Bethlehem XX Carbon Tool Steel . . . and the first cutter made from it finished 175 pieces.

It's just another instance of the longer tool life made possible by selecting the right grade of tool steel for the job. Our technical staff is always ready to assist in selecting tool steels and in recommending the best methods of heat-treating.

Bethlehem ULTRASONIC TESTED **Tool Steel**



6" x 15" Jones & Lamson Automatic Thread Grinder.

FACTS on improving production!

80 PIECES PER HOUR!
(CLASS IV THREADS)

The New Process Gear Corporation, Syracuse, N.Y., installed a Jones & Lamson Automatic Thread Grinder to grind Class IV threads on main drive pinions. The threads are ground from the solid, after the piece has been completely machined (including the keyway in the thread diameter) and hardened.

This is how their investment paid off:

PRODUCTION: 80 CLASS IV THREADS PER HOUR
SCRAP REDUCED 50%
SUBSTANTIAL SAVINGS IN DIRECT LABOR COSTS, OVERHEAD AND GAGE COST.

In addition to better quality threads and more uniform finish J&L Automatic Thread Grinders:

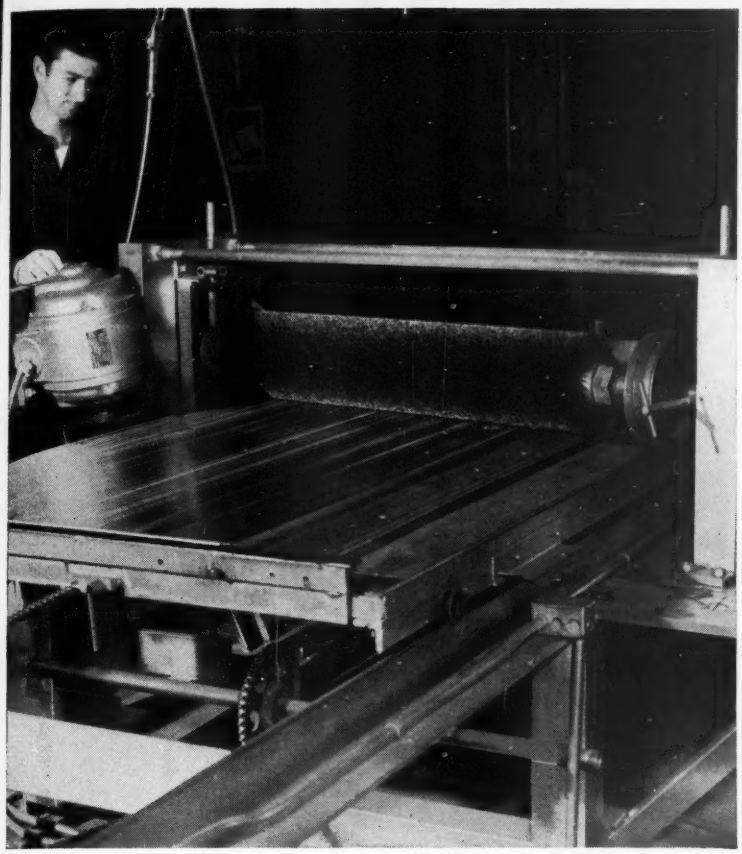
- reduce handling costs
- eliminate costly rethreading after heat treatment
- eliminate expensive retooling when specifications change
- reduce the cost of gage maintenance

Now, more than ever, the most efficient machines and methods are needed to make the most of your available manpower and material. Jones & Lamson is ready, willing and able to help you get maximum results from your turning, threading and inspection operations. Write *today* to Department 710.

Turret Lathes—Fay Automatic Lathes—Thread Grinders—Optical Comparators—Threading Dies

JONES & LAMSON
MACHINE COMPANY
Springfield, Vermont, U.S.A.

Machine Tool Craftsmen Since 1835



What takes off the coat and helps the salesmen?

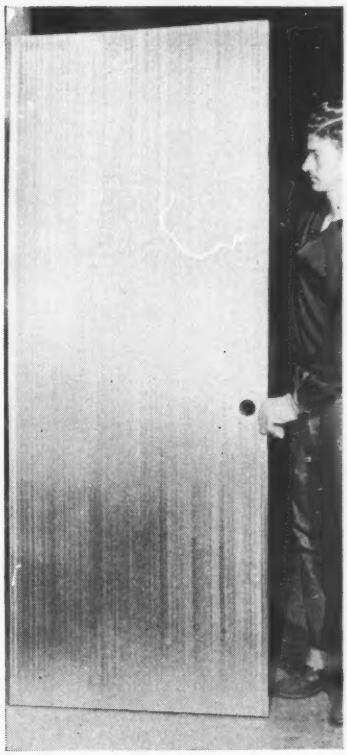
...*a brush!* Here's a door-way to better aluminum products:

The product is an aluminum door. It was impractical to make lacquer adhere uniformly to the aluminum. With the help of the **O**sborn **B**rushing **A**nalyst, a machine using Osborn wire brushes was built to prepare the surface for lacquering. Result: lacquer sticks perfectly to the brushed surface, giving an attractive, durable finish that helps sales.

The **O**sborn **B**rushing **A**nalyst is opening the door to lower costs and better products of every description. Have him survey your operations, including cleaning and finishing. Call or write *The Osborn Manufacturing Company, Dept. 520, 5401 Hamilton Avenue, Cleveland 14, Ohio.*

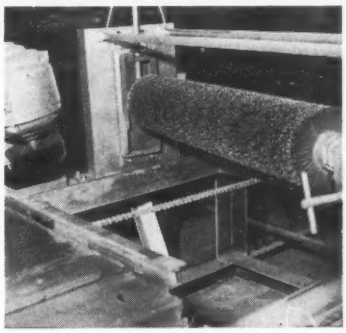
OSBORN

LOOK FOR THE NAME OSBORN . . . RECOGNIZED EVERYWHERE FOR QUALITY WORKMANSHIP AND MATERIALS



THE ALUMINUM DOOR

Osborn wire wheel brushes have removed the blemishes and prepared the surface for lacquering.



THE BRUSHING MACHINE

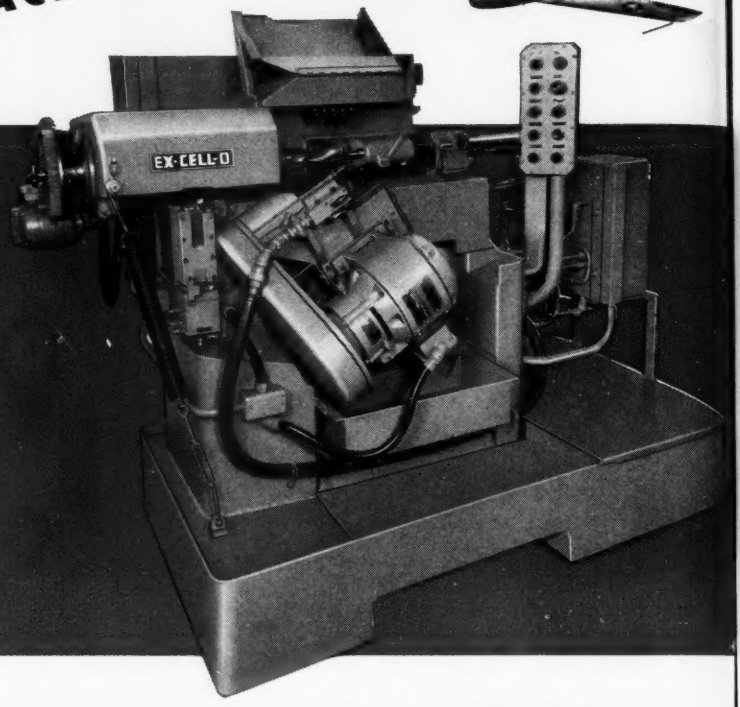
Door is mounted on a conveying table which travels under Osborn brushes mounted as shown. Brush at left brushes side of door. After traveling one way, door is turned over and table reverses.

YOU TOO

can have a simple brushing machine to help you produce better, more salable products. Let Osborn show you how.

EX-CELL-O

PRODUCTION-PROVED MACHINE MILLS JET BLADES



Above: Jet blades of this type can be milled quickly, accurately, efficiently on the Ex-Cell-O Profile Miller.

Right: Ex-Cell-O Precision Profile Miller, Style 86.

XLO

EX-CELL-O'S COMPLETE LINE OF STANDARD MACHINES FOR FINISHING JET BLADES:

STYLE 85, FOR GRINDING THE ROOT FORM

STYLE 86, FOR MILLING THE AIRFOIL

STYLE 87, FOR GRINDING THE AIRFOIL

STYLE 88, FOR POLISHING THE AIRFOIL

MILLS COMPLETE AIRFOIL, INCLUDING LEADING AND TRAILING EDGES—AUTOMATICALLY

Here is a production-proved machine for automatically milling the complete airfoil form (including leading and trailing edges) of jet engine compressor blades. An outstanding feature is the use of back rests that support the blade rigidly throughout each cutting stroke to prevent deflection of the blade by pressure of the milling cutter.

The Ex-Cell-O Precision Profile Miller, Style 86, is hydraulically operated and fully automatic except for loading, unloading and pressing the start button. The airfoil form is generated by a master cam made from the engineers' glass layouts. The work travels lengthwise across the milling cutter and is indexed after each cutting stroke, the indexing and cutting being repeated until the part has rotated 360 degrees.

For further information and detailed specifications on blade finishing machines write, wire or phone to Ex-Cell-O in Detroit.

EX-CELL-O CORPORATION DETROIT 32, MICHIGAN

MANUFACTURERS OF PRECISION MACHINE TOOLS • CUTTING TOOLS • RAILROAD PINS AND BUSHINGS
DRILL JIG BUSHINGS • AIRCRAFT AND MISCELLANEOUS PRODUCTION PARTS • DAIRY EQUIPMENT

STEEL
The Weekly Magazine of Metalworking

VOL. 129 NO. 9 AUG. 27, 1951

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Next Week ... **Getting the Most Out of Going to a Convention ... Hammer Techniques Advance Speed Fabrication of Aircraft Exhaust Systems ... Magnesium Alloys Can Be Machined Efficiently ... Brass Wire Batch Annealed in "Pan-Pull" Furnace**

Published every Monday by the Penton Publishing Company, Penton Building, Cleveland 13, Ohio. Subscription in the United States and possessions, Canada, Mexico, Cuba, Central and South America, one year $10; two years $15; all other countries, one year $18. Single copies (current issues) 35 cents. Metalworking Yearbook issue $2.00. Entered as second class matter at the postoffice in Cleveland, under the Act of March 3, 1879. Copyright 1951 by Penton Publishing Co.

Smoother Finish Longer Tool Life

with

PELRON Soluble Cutting Oils

Here's what production men have been praying for—a cutting oil that will give smoother and freer removal of metal, with cooler operation and longer tool life.

PELRON SCO 252, developed through extensive research following the newer theories of water soluble cutting oils, has the unique property of breaking loose successive globules of oil at the point of extreme pressure for extra lubrication. Once past the pressure point, or inter-face of the tool, PELRON SCO 252 immediately goes back into a stable emulsion. This characteristic accounts for the unusually smooth cutting action, the prolonged tool life and all-round improved machine operation.

PELRON SCO 252 is clear, light amber, and remains so, giving good visibility at the work point. It forms a complete and permanent emulsion with water of any type and hardness.

It settles chips readily in the system, prevents rancidity, odor, or deterioration. In fact, it can be used for months on cast or malleable iron with no rusting, odor, or breaking down of the emulsion.

ISN'T THAT WHAT YOU'VE BEEN PRAYING FOR?

Contact our nearest sales office for a sample and demonstration. Our metal processing experience and engineers are at your service. Let's hear from you.

PELRON CORPORATION
7740 W. 47TH STREET
LYONS, ILLINOIS

Sales offices: Chicago • Detroit • South Bend
Cleveland • Milwaukee • Indianapolis • Rock Island

Behind the Scenes . . .

Problems of Health

A while back we visited a radiochemical lab which was dealing with isotopes for industry. In charge of the place was a surprising young fellow whom we'll call Mr. Smith. He met us in the office of the lab where four or five technicians—one woman and the rest men—were working away at desks.

"We have problems of health here that are unusual," said Mr. Smith leading us to a corner of the office where hung a small wall rack. In that rack were several grayish squares to which were affixed clips similar to those on fountain pens or mechanical pencils. Under each square in the rack was someone's name. Mr. Smith picked the one above his name and clipped it on his shirt pocket. "All of us wear these periodically to determine how much radioactive material we're picking up in our body as we work day after day in the lab. This card is checked every so often, and if we're picking up too much, we have to stay out of the lab for a while."

Next to the rack was a door marked "Men's Locker Room." We filed through that to find ourselves in a typical locker room except that it contained an automatic washing machine. "We give our lab coveralls a first wash after we use them to get rid of any radioactive material," Smith explained. "That's so nothing radioactive will get into other clothes when our outfits get a thorough wash at the commercial laundry."

We noted a single stall shower in the room and two sets of lockers as widely separated as possible. One set housed street clothes, one the lab attire.

From the locker room we went into a regular laboratory. All large flat surfaces, we were told, were of stainless steel. Two technicians were in the room, wearing rubber aprons and rubber gloves up to their elbows. One was at a sink where he operated the water outlet with his knee by means of a device below the sink. "We want no radioactive material getting on faucets that could be touched by someone without gloves," Smith explained.

He pointed out that the whole layout is air conditioned, but in manner so that the lab is warmer in one end than another. That's because some isotopes must be handled at outside temperatures. The whole lab is cut off from the rest of the plant by heavy masonry.

In one corner of the lab we were shown a strange box-like contrivance with two big holes in the front and a glassed portion at the top. Technicians work with "hot" stuff in that box. Through the holes go the man's rubber-gloved hands and arms which —with tools and gadgets—work with the substance while the rest of his body is outside the box and out of harm's way.

Smith next took us into a room with a geiger counter and explained how the thing works. But we never have been able to understand the thing. We eventually wound up in the office again where we noticed an elaborate first-aid layout in the corner.

Our man waved in that direction. "We have to give initial first aid immediately to all cuts, scratches and rashes on the people who work in here. If you expect to live a normal-length life when you make your living with this stuff, you have to be careful."

Puzzle Corner

In the problem of Aug. 13 there were two noblemen and one huntsman, according to our little black book. We're beginning to wonder if that guide is wrong, because at the time we went to press we had received answers varying all over the map, including several that said we had misstated the problem. That could be. Those who sent in varying answers include Raymond J. Bressler of Kol-Master Corp., A. T. Wegene of Beals, McCarthy & Rogers Inc., E. L. Peterson of Hotpoint Inc. and Robert W. Huff of Canton, O.

A coal company appointed an agent, agreeing to pay him a salary of $265 for six months, all the coal at the end of that time and all of the profits to belong to the company. The company furnished him with coal to the amount of $825.60 and $215 in cash. Agent received for coal sold $1,323.40, paid $937 for coal bought, paid sundry expenses authorized by the company $129, paid his own salary $265, paid to the company $200, delivered to indigent persons by order of the company coal to the amount of $13.50

At the end of the six months the company took possession and found coal amounting to $616.50. The agent then paid to the coal company the money belonging to them. How much did he pay? Did the company gain or lose by the agency and how much?

Shrdlu

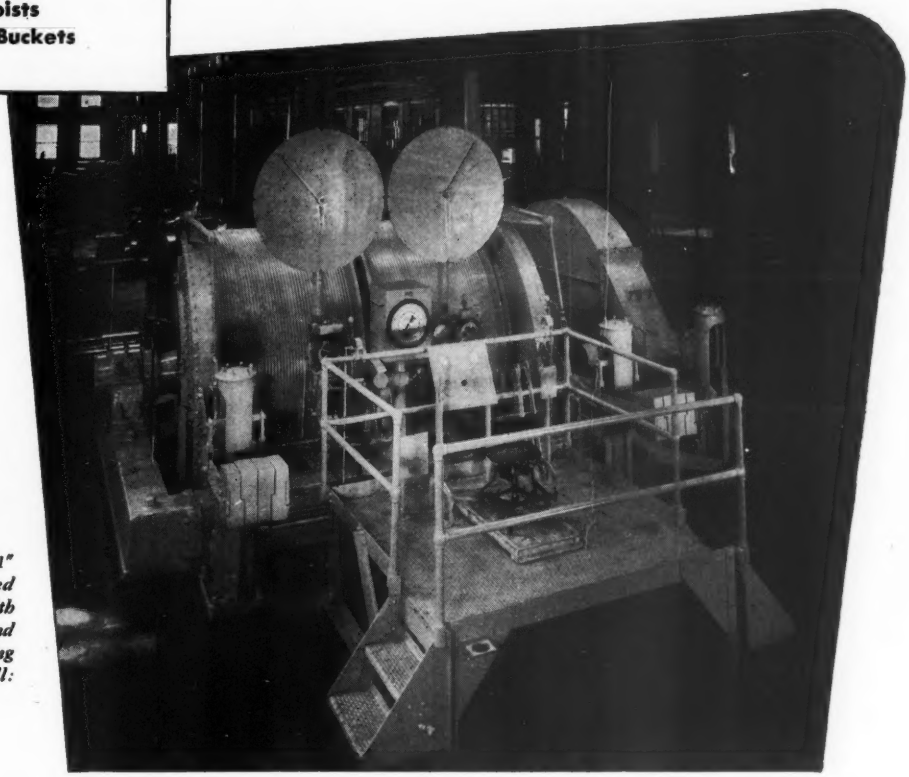
(Metalworking Outlook—Page 35)

Wellman will build it

- Special Cranes
- Mine Hoists
- Car Dumpers
- Gas Producer Plants
- Ore Bridges
- Charging Machines
- Industrial Furnaces
- Gas Flue Systems
- Gas Reversing Valves
- Coke Pushers
- Skip Hoists
- Clamshell Buckets

Wellman Electric Mine Hoists

Proved by performance



Wellman 10' x 4' 11" Double Drum Geared Electric Mine Hoist with 7' axial plate clutch and 10' x 13' Parallel Acting Brakes. Rated rope pull: 22,000 lbs.

● For more than half a century, in mines all over the world, Wellman Electric Mine Hoists have been used because they combine expert design with expert construction . . . featuring all the "modern improvements" developed in our 50 years' experience. Wellman Mine Hoists provide maximum safety, peak economy, and trouble-free operation under a wide variety of conditions. Let us give you recommendations for hoists that will do your job most satisfactorily.

THE WELLMAN ENGINEERING COMPANY

7029 CENTRAL AVENUE • CLEVELAND 4, OHIO

PRECISION *plus*

. . . threads cut to Class 7 tolerances

Continuous threads cut on studs must meet exacting requirements to withstand the high pressures and temperatures to which pressure vessels, steel pipe flanges, fittings, and valves are subjected.

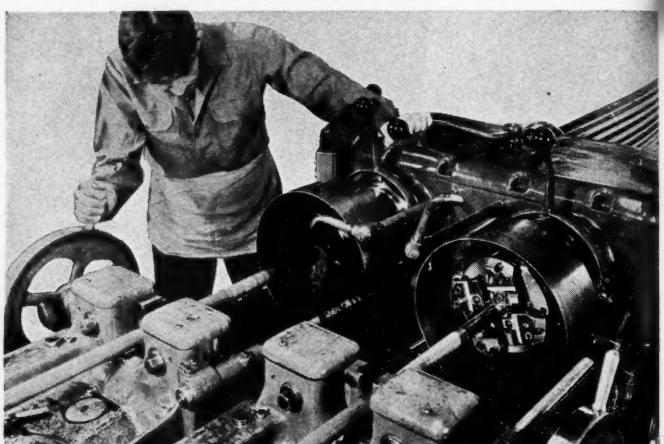
At the R.E.C. Corporation, New Rochelle, N. Y., continuous 1⅜" 8P threads are cut to within pitch diameter limits of .002 on 12-foot heat-treated bar stock of 269 to 311 Brinell hardness. The fully threaded bars are then cut into the desired stud lengths.

By using Double Head LANDMACO Leadscrew Threading Machines equipped with Hardened and Ground 2" LANCO VV Heads, threads ranging in diameter from ½" to 2" are cut in one pass with consistently fine finish to Class 7 tolerances. The leadscrew provides a positive, mechanical means of feeding the work into the die heads, thus assuring the maintenance of close lead tolerances.

Even on this precision threading operation, net production is good, averaging 36 linear feet per hour at a cutting speed of 25 surface feet per minute. An average of 108 linear feet of threads is cut between chaser regrindings, resulting in low tool cost and minimum down time.

Having given many similar outstanding performances in other fields, LANDMACO Machines can help to cut costs, step up output, and improve finish and accuracy in your thread production.

For complete information, write for Bulletin H-75.

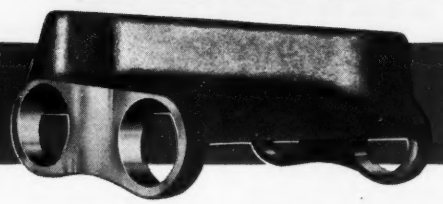


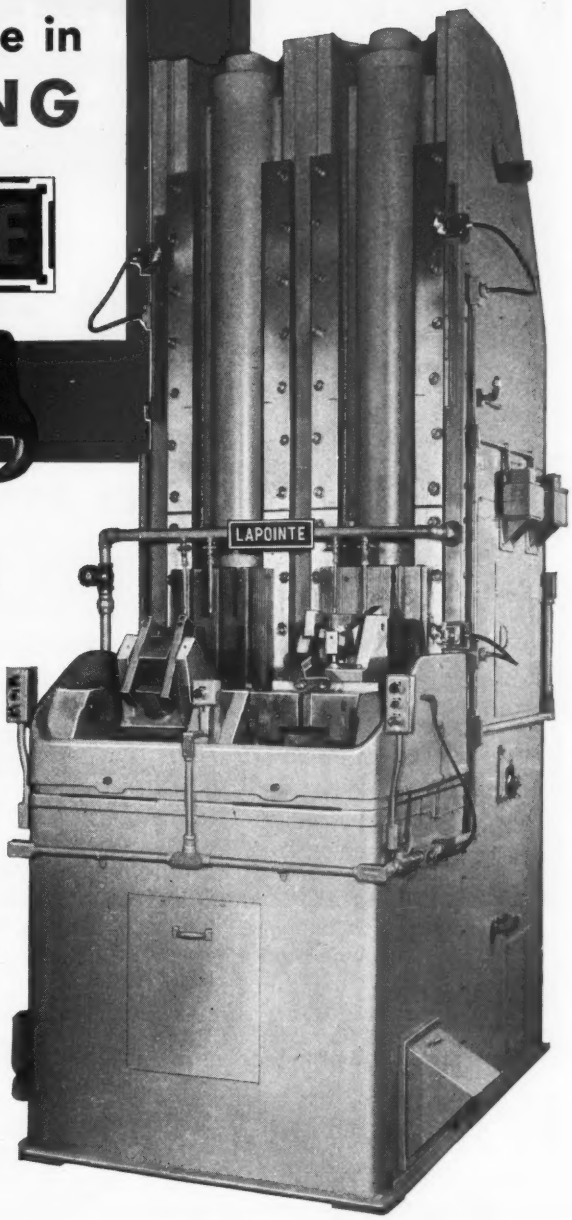
LANDIS MACHINE COMPANY

WAYNESBORO, PENNSYLVANIA

THREADING MACHINERY—THREAD CUTTING DIE HEADS—COLLAPSIBLE TAPS

The biggest name in BROACHING ...is LAPOINTE





LAPOINTE'S name is big because it's the world's *oldest* manufacturer of broaches and broaching machines . . .

Because it's also the world's *largest* . . .

Because its engineering facilities and production know-how are unequalled . . .

Because it takes responsibility for the complete job: machines, tools, and fixtures . . .

Because it represents the accumulation of nearly 50 years of broaching experience . . . designing, building, and tooling such machines as this LAPOINTE

25 ton, 66-inch stroke

Double ram vertical, heavy duty

BROACHING MACHINE

with fixtures that automatically centralize and hydraulically clamp; electrically interlocked with the ram of the machine.

Simple to operate, simple to load and unload. That's why this machine has such a high production rate, even for relatively large parts. Shown here, it is broaching tank track link shoes from a chrome vanadium forging, at a speed of 200 parts per hour — at 85% efficiency!

You can learn more about LAPOINTE Double Ram Vertical Broaching Machines if you write today for Bulletin DRV-3.

THE Lapointe MACHINE TOOL COMPANY

HUDSON, MASSACHUSETTS • U. S. A.

Branch Factory: Watford, Herts., England

THE WORLD'S OLDEST AND LARGEST MANUFACTURERS OF BROACHES AND BROACHING MACHINES

ARCOS

Low Hydrogen Electrodes Weld High Tensile Steels

- Without Preheating
- Free of Underbead Cracks

USS MAN-TEN — ® United States Steel Co.

HIGH TENSILE STEEL YOLOY — ® Youngstown Sheet & Tube Co.

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HI-STEEL — ® Inland Steel Co.

REPUBLIC ALDECOR — ® Republic Steel Corp.

As well as other low alloy steels of similar analysis.

For more information request • Booklet—ABC's of Welding High Tensile Steels • Selector Chart 9501—Welding Trade Named Steels.

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Stainless, Low Hydrogen and Non-Ferrous Electrodes

STEEL

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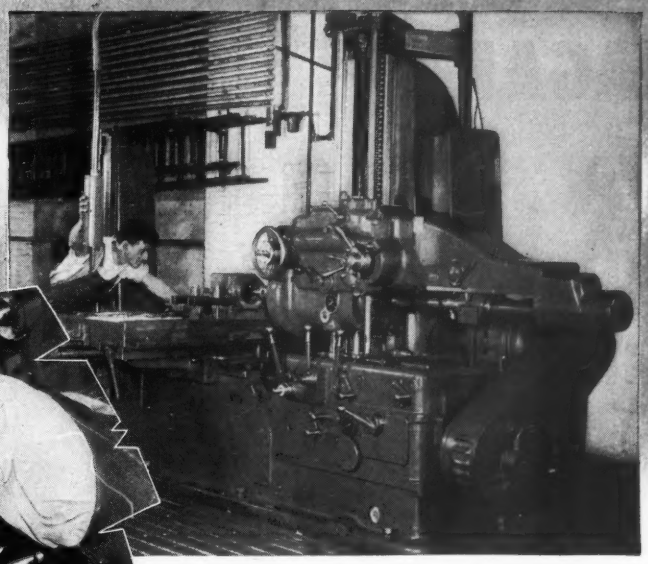
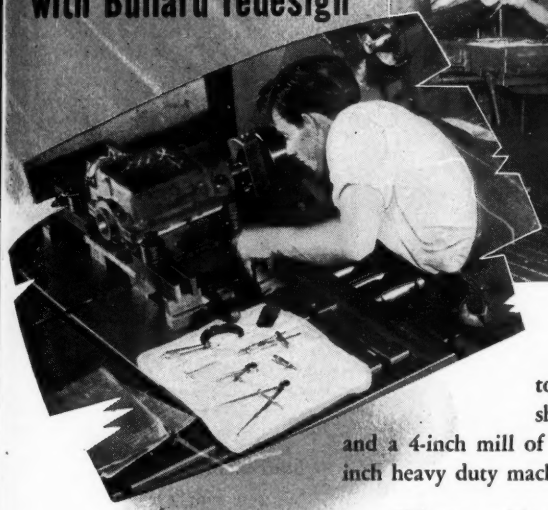
Good machines those Universals—BUT NOW Even Better machines with Bullard redesign





Out of 6 Universal Boring Machines in one customer's shop, two are more than 30 years old and still show good performance. A 3-inch mill is 3 years old and a 4-inch mill of about the same age. Furthermore there is another 4-inch heavy duty machine and a 3-inch about a year old.

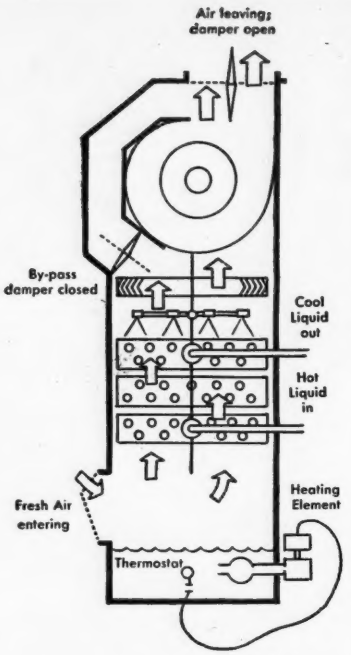
The customer says — "These machines possess Reliability and great Flexibility. They meet our requirements because our work is so diversified and yet we require a very accurate machine for back boring, which is a complicated operation done accurately on these machines."

The foregoing bespeaks Consistent Service from the old line of machines. NOW the new heavier design with 4-WAY BED, features providing longer useful life with maintained Accuracy, hydrodynamic main drive with brake motor, Traybon lubrication system for ways and external bearings make Bullard Horizontal Boring, Milling and Drilling Machines an important item for your very earnest consideration.

THE BULLARD COMPANY · BRIDGEPORT 2, CONN.

Ask a **BULLARD** representative to outline the application of a **BULLARD** Horizontal Boring Mill to your work.

NIAGARA Aero Heat Exchanger



U. S. Reissue Patent Nos. 22,533 and 22,553

1. Extends quenching capacity without extra water or cooling tower.
2. Quickly pulls down heat at initial peak load of Quenching.
3. "Balanced Wet Bulb" Control holds quench bath at proper temperature, heating if needed to start after shut-down, and cools or heats by automatic control.
4. Saves cleaning expense as compared to cooling tower which picks up acids and fumes from air.

APPLICATIONS	USED IN THE MANUFACTURE OF OVER 400 PRODUCTS INCLUDING
Quench Oils	Aluminum, copper, steel, nickel and alloys.
Cutting Oils	Diesel, aircraft, automotive and other engines.
Lubricating Oils	Chemical processes, plastics, adhesives.
Cooling water and brine	Gears, bearings, forgings and castings.
Cooling gas and compressed air	Wire, controls, electronic products.
	Ammunition, explosives, shells, ordnance, firearms.
	Farm machinery, tools, hardware.

For help in increasing production, saving of cooling water, write for Bulletin #120. Address

NIAGARA BLOWER COMPANY

Over 35 Years' Service in Industrial Air Engineering

Dept. S , 405 Lexington Ave. New York 17, N. Y.

Experienced District Engineers in all Principal Cities

LETTERS
TO THE EDITORS

A Need for Data

We are making equipment for high pressure-high temperature service in the chemical process industries and require specific steel data for design purposes. We will appreciate sources for information on high temperature mechanical properties of carbon, alloy and stainless steels—especially high temperature tensile, yield, elongation and creep data, plus information on corrosion resistant properties of these same steels.

W. H. Reynolds
American Instrument Co. Inc.
Silver Springs, Md.

• *We know of no single source for data on high temperature and corrosion resistance properties of alloy and stainless steels. A good bet: The Metals Handbook of the American Society for Metals. Another good source may be American Iron & Steel Institute's Steel Products Manual.*

Do you have further data on your item "Surface Blackouts," (STEEL, July 2, p. 73)?

John R. Gilmore
Canadian General Electric Co.
Davenport Works
Toronto, Ont.

• *Write to Mitchell-Bradford Chemical Co., 2446 Main St., Stratford, Conn.*

Can we still get reprints of your article, "Quality Control . . . It Works in Small Plants, Too?"

Virginia Pearson
Merchandise Testing & Development Laboratory
Sears Roebuck & Co.
Chicago

• *This article was not reprinted—however, please accept five copies of* STEEL's *July 16 issue with our compliments.*

A Search for Suppliers

Can you supply us with sources for invar rod or tubing?

W. E. Fernie
Espey Mfg. Co.
New York

• *We suggest Driver-Harris Mfg. Co., Harrison Station, N. J.; Simonds Saw & Steel Co., Lockport, N. Y.; or Latrobe Electric Steel Co., Latrobe, Pa.*

Please send us a list of mills that roll flat bars and "T" shapes.

Edward Sisson
American Architectural Iron Co.
Boston

• *See* STEEL's *Guide for Steel Buyers, containing a complete list of important producers of these products.*

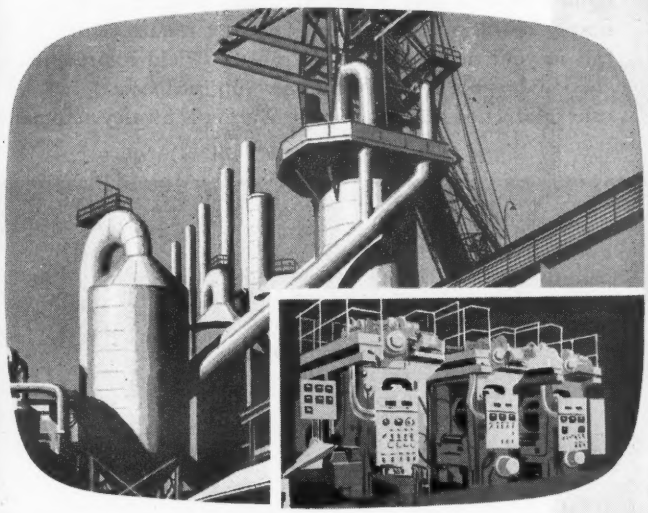
A Question of Manufacturers

We note in STEEL, December 19, 1949, an article titled, "Rough Castings To Finished Piston in Less Than Three Minutes." Can you send us names of companies who make the casting machine and lathe described as being in use in this process?

Kolben-Kraus
Wien 3, Stammgasse 2
Austria

• *Manufacturer of the casting machine was Briggs & Stratton Corp., 2711 N. 13th St., Milwaukee; the lathe maker was Jones & Lamson Machine Co., Springfield, Vt.*

A NEW PARTNERSHIP FOR *Steel production*



The recently-approved acquisition of The Thomas Steel Company by Pittsburgh Steel Company is an especially fortunate partnership. It becomes effective August 31, 1951.

Blast furnaces, open hearths, blooming mills and a new hot strip mill of an integrated producer now are combined with the cold rolling and plating facilities of one of the nation's foremost strip steel producers. The Pittsburgh-Thomas cycle now is complete —from iron ore to precision cold rolled, and pre-coated strip steel.

To *Thomas Customers,* this partnership means an additional source of the raw material necessary to meet the ever-increasing demand for their products.

To *Pittsburgh Steel Customers, it is* another important step in its current expansion program to increase and widen its range of quality steel products.

And to *American Industry* and to the *Public,* this merger marks another milestone in the Steel Industry's rapid advance toward its ultimate goal: More and better steel to meet the needs for national defense, as well as for industrial and civilian consumption.

THE THOMAS STEEL COMPANY • Warren, Ohio

PITTSBURGH STEEL COMPANY • Pittsburgh, Pa.

Pittsburgh Steel

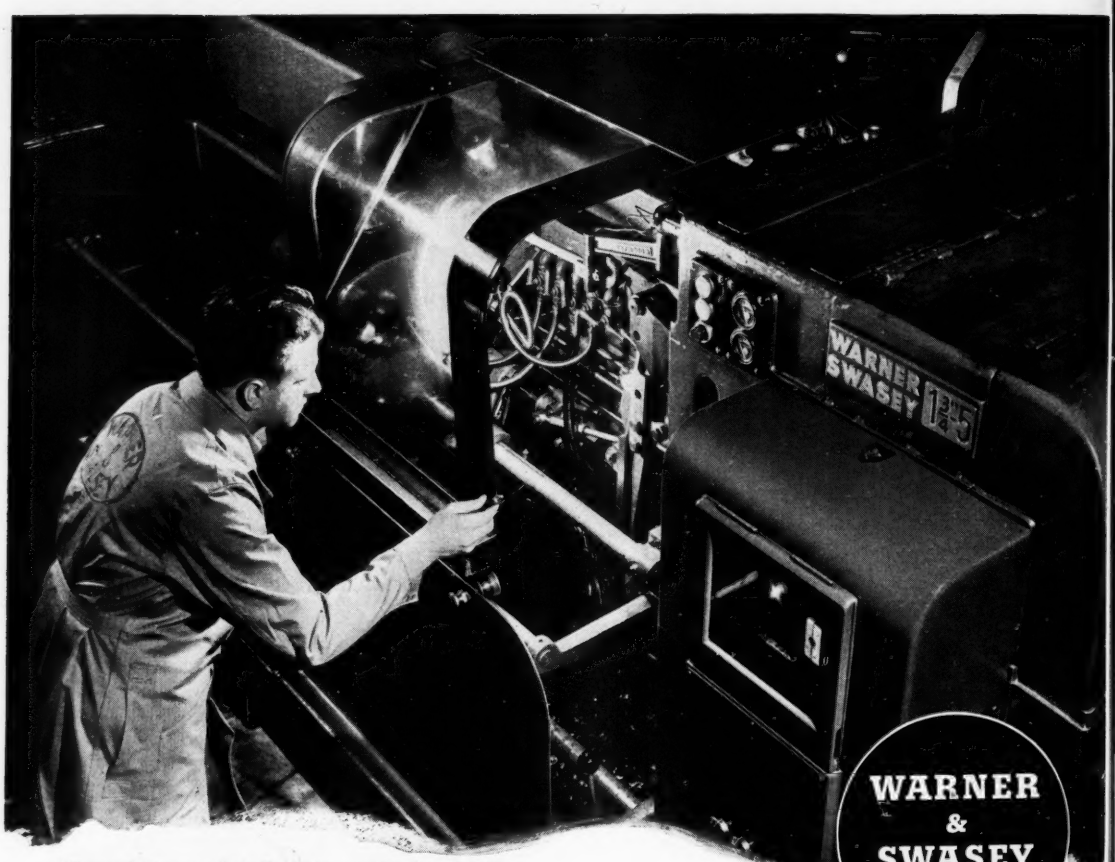
Don't buy five machines when two will do the job— BETTER!

● Let's say you received a defense order in 1941 that required purchasing 5 turret lathes.

Today, when you receive a similar order, it might be quite natural for you to assume you'd again need 5 machines. But just as weapons or products have developed, so have the tools with which they're made.

In many cases these products can be made faster and more profitably with Warner & Swasey automatics —machines developed since the last war. Instead of reordering, say, 5 turret lathes, you may need only 2 of these automatics. They'll cost you less in total investment, require less floor space and fewer operators, and turn out more uniform parts at a higher rate.

Of course, there are—and always will be—many jobs that should be done *only* on turret lathes. But before you simply reorder according to your past requirements, first call in your nearest Warner & Swasey Field Representative. He may be able to show you how you can boost your production and profits with Warner & Swasey automatics.



Warner & Swasey 5-Spindle Automatic Chucking Machine, one of Warner & Swasey's line of automatic machines.

WARNER & SWASEY
Cleveland

YOU CAN MACHINE IT BETTER, FASTER, FOR LESS WITH WARNER & SWASEY TURRET LATHES, AUTOMATICS AND TAPPING MACHINES

QUALITY YOUNGSTOWN SERVICE

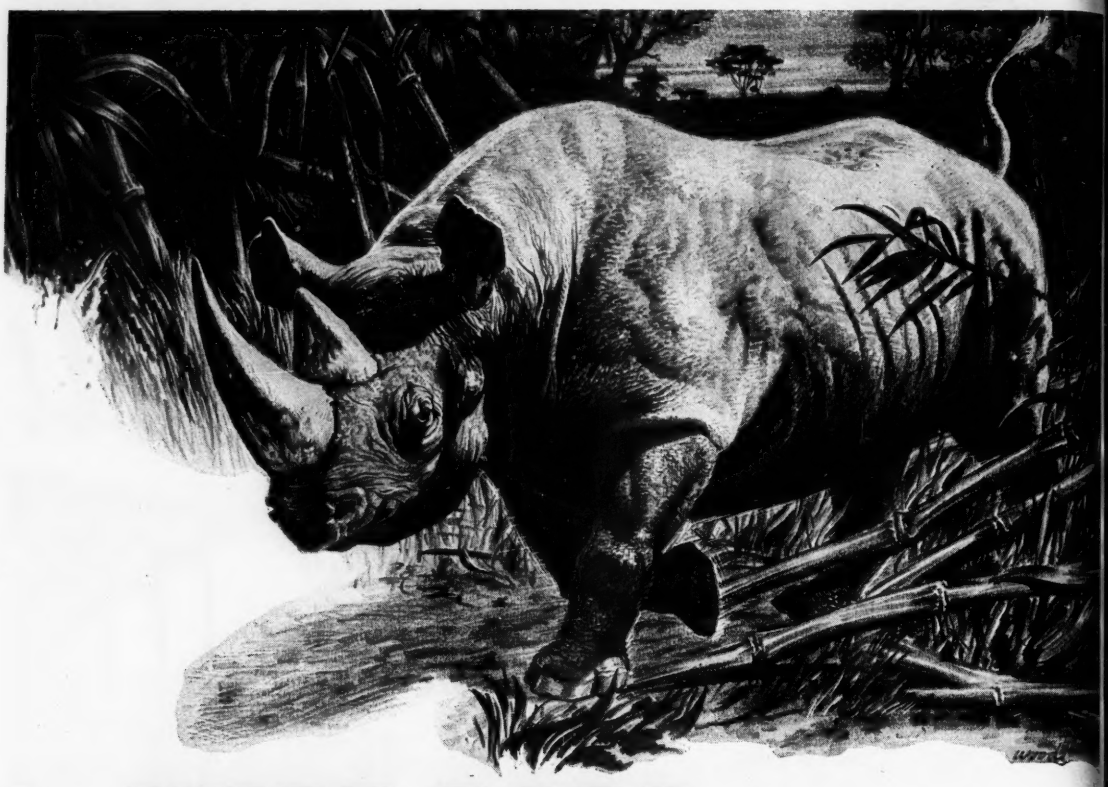
SCRAPPY SAYS:
AID DEFENSE
MORE SCRAP TODAY...
MORE STEEL TOMORROW

THE iron and steel industry faces a serious scrap shortage, growing more critical every day. . . . It will be impossible for producers to make the steel tonnages demanded for rearmament and essential civilian needs, unless consumers cooperate by furnishing *more scrap*. . . . Most desperately needed now is heavy industrial iron and steel scrap. . . . Keep the cobwebs from gathering at your own plant by turning in more of your own scrap today.

The Youngstown Sheet and Tube Company

General Offices--Youngstown 1, Ohio
Export Offices--500 Fifth Avenue, New York
MANUFACTURERS OF CARBON ALLOY AND YOLOY STEELS

The steel industry is using all its resources to produce more steel, but it needs your help and needs it now. Turn in your scrap, through your regular sources, at the earliest possible moment.



in WIRE ROPE, too

It's all in the RIGHT KIND of Muscle

The powerful, rugged muscles of a charging rhino enable him to propel his tremendous bulk and weight at truly remarkable speed. Nature designed them well for the purpose they have to serve.

In wire rope, too, the right kind of muscle is vitally important... because different types of jobs present different types of destructive forces. Bending fatigue! Shock stress! Abrasion! Load strain! Each demands wire rope that best combines the required resistance characteristics.

Wickwire Rope gives you the benefit of long experience and specialized know-how which assures you of exactly the right kind of rope your particular job demands.

For additional information write or phone our nearest sales office.

EAST: WICKWIRE SPENCER STEEL DIV.—Boston • Buffalo • Chattanooga • Chicago • Detroit • Emlenton (Pa.) • Philadelphia • New York
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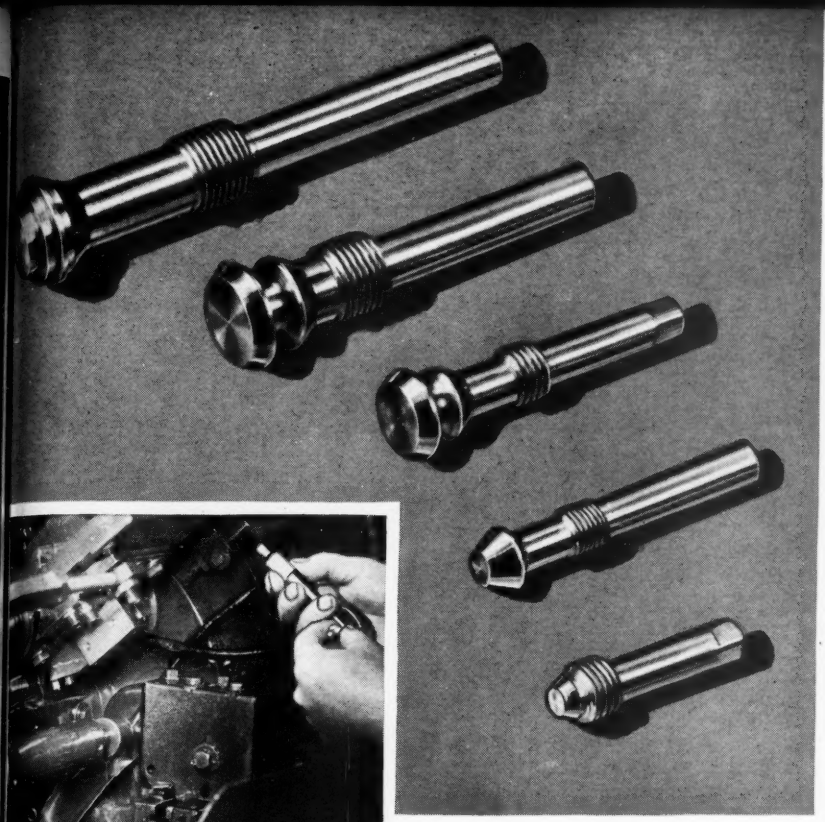
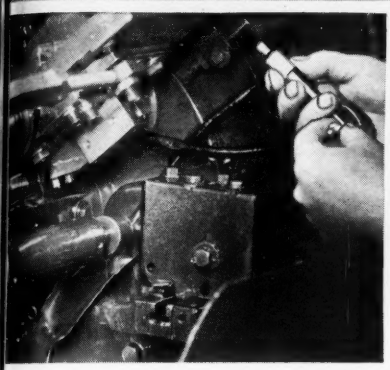
PRODUCT OF WICKWIRE SPENCER STEEL DIVISION
THE COLORADO FUEL & IRON CORPORATION

WICKWIRE ROPE
CF&I PRODUCT

LOOK FOR THE YELLOW TRIANGLE ON THE REEL





Spells "finish" for another cutting problem

HERE'S the problem one midwest manufacturer posed to a Standard Oil lubrication specialist: improve the finish of steel valve seats produced on an automatic screw machine *and* reduce cutting oil costs.

STANICUT Cutting Oil 117 BCS was recommended and put to work. The problem was solved on both counts since STANICUT resulted in a finer finish on the valve seats and cost less than the oil previously used. Plant operators found a *bonus* advantage in STANICUT when records revealed longer tool life. That meant lower tool costs and less downtime for tool changes . . . additional economy in the cost of machining these parts.

In this case STANICUT replaced a single, more expensive cutting oil. In plant after plant, however, STANICUT has proved so versatile that it has replaced a variety of conventional oils, often serving every operation in the shop or department.

There is a Standard Oil lubrication specialist at your service wherever you are located in the Midwest. For his help in selecting a better cutting oil for your operation (or operations) contact your local Standard Oil office or write:

Standard Oil Company (Indiana), 910 South Michigan Avenue, Chicago 80, Illinois.

STANICUT
TRADE MARK
Cutting Oil

What's your problem?

D. J. Clark, of Standard Oil's Saginaw office, is the lubrication specialist who recommended STANICUT in this case, and thereby not only solved the problem at hand, but made additional savings possible for the manufacturer.

His on-the-job service is typical of that available to all midwest plants through a corps of such specialists. You can be sure that the specialist in your area has both the practical experience and the training in a Standard Oil Lubrication Engineering School that will result in dependable, thorough assistance.

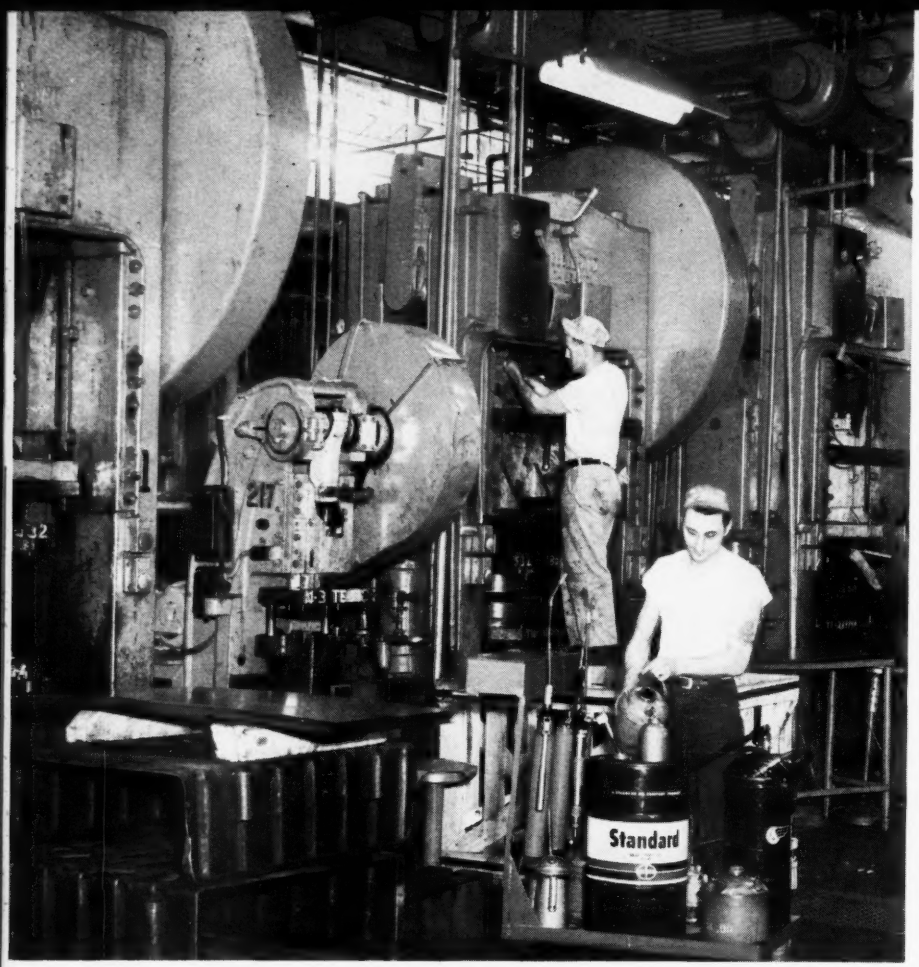
A post card or phone call to your nearest Standard Oil (Indiana) office is all that's necessary to put a Standard lubrication specialist to work on your problem. When he calls, be sure to discuss the advantages and performance records of these outstanding products:

STANICOOL HD Soluble Oils—Because they contain additional compounding, these heavy-duty soluble oils possess not only the cooling ability of an emulsion but also the ability to give better tool life and finer finishes than can be obtained with a conventional soluble oil.

STANOSTAMP Compounds—Here are three established products for stamping or heavy drawing operations of either low-carbon or alloy steels. Water can be added to these paste compounds to provide the most economical applications. STANOSTAMPS offer maximum protection for dies and work. These compounds can be readily removed in conventional washing equipment.

STANDARD OIL COMPANY

STANDARD *(Indiana)*



No drips in this press room

WHEN plant engineers at the A. O. Smith Corporation Kankakee Works tested STANODRIP Dripless Oil No. 59 on the recommendation of a Standard Oil lubrication specialist, they found the solution for press room lubrication troubles.

STANODRIP ended the drippage of oil from bearings on stamping and punch presses. That meant cleaner and safer working conditions, less lubricant consumption, and fewer lubrication applications. As a result, STANODRIP is now used throughout the press room and is being adopted by other departments as well. "Reduced maintenance costs and longer life of our equipment are definite advantages . . . ," says Don Hartquist, Plant Engineering Supervisor.

To help put STANODRIP Dripless Oils to work wherever leakage or drippage is a problem . . . or for assistance in all phases of industrial lubrication . . . call in the Standard Oil lubrication specialist in your area. Contact your local Standard Oil Company (Indiana) office, or write: Standard Oil Company (Indiana), 910 South Michigan Avenue, Chicago 80, Illinois.

Stanodrip
REG. U.S. PAT. OFF.
Dripless Oil

What's your problem

C. B. Eggen of the Standard O office in Joliet is the specialis who helped solve this press roo lubrication problem for A. O Smith Corporation.

With a broad background o practical experience and specia training, his service is typical o the assistance available to plant located everywhere in the Mid west. Like others in the corps o Standard Oil lubrication specia ists, he makes his headquarter near the plants he serves.

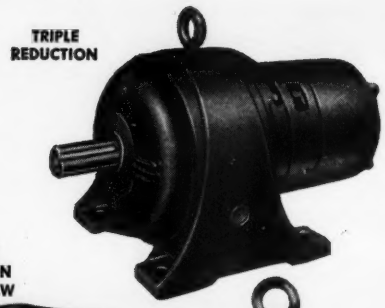
To take advantage of prompt on-the-spot service in your own plant, phone or write the Stand ard Oil office in your area. When the lubrication specialist calls on you, be sure to get full informa tion on these fine Standard Oil products:

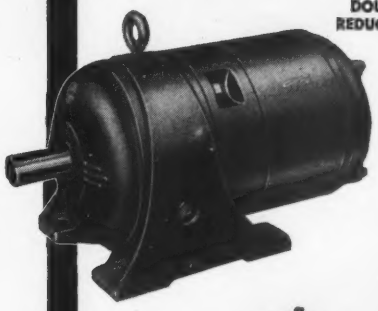
CALUMET Viscous Lubricants—These greases strongly resist washing and throw-off. Their superior wetting ability affords better coating of open gears and chains, better internal lu brication of wire ropes.

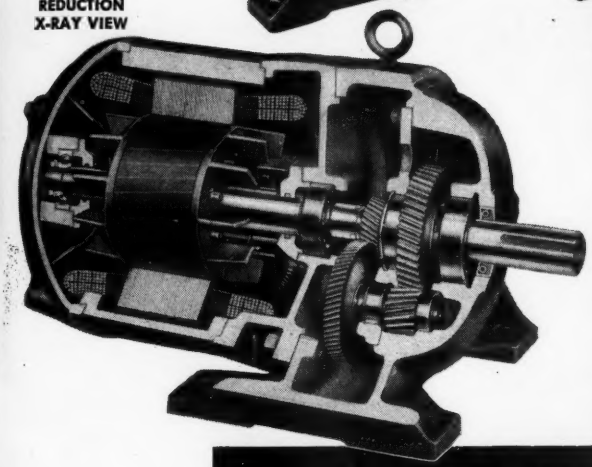
STANORUST Rust Preventives—The eight grades of STANORUSTs form one of the most complete and effec tive lines of rust preventives avail able. Each has been scientifically developed for its intended use. The grades range from a fingerprint re mover to a heavy petrolatum that protects against corrosion for years under the most severe outdoor expo sure.

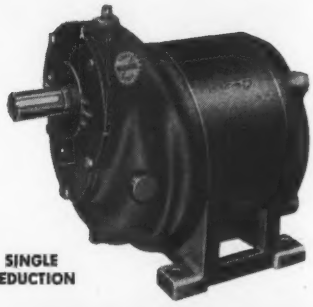
STANDARD OIL COMPANY (Indiana)

STANDARD









FOOTE BROS.-LOUIS ALLIS GEARMOTORS

PROMPT DELIVERY!

Would prompt delivery of Gearmotors solve your problem?

If you're up against costly delay, then keep in mind that you can count on prompt delivery of Foote Bros.-Louis Allis Gearmotors.

Foote Bros. offer the finest Gearmotor obtainable. A Gearmotor of superior design and construction—produced jointly by Foote Bros. and Louis Allis—both leaders in their respective fields.

Foote Bros.-Louis Allis Gearmotors are available in single, double and triple reductions to provide output speeds of 780 down to 7.5 r.p.m. Capacities from 1 h.p. through 150 h.p. Open drip-proof, splash-proof, enclosed and explosion-proof motors.

Mail the coupon for Bulletin GMA.

FOOTE BROS.
GEAR AND MACHINE CORPORATION
Dept X, 4545 South Western Blvd., Chicago 9, Ill.

- **Duti-Rated Gears—file hard tooth surfaces—resilient cores.**
- **Tang driven motor shaft pinion positively positioned.**
- **Extra capacity ball or tapered roller bearings.**
- **Cast iron housing for maximum rigidity under load. Large oil reservoir, splash lubrication.**
- **Leakproof oil seals.**
- **Dynamically balanced die-cast aluminum rotor. Impregnated windings assure protection from moisture, dust, and oil.**
- **Ball bearing motor for trouble-free operation.**

FOOTE BROS.

Better Power Transmission Through Better Gears

Write for Bulletin GMA

Foote Bros. Gear and Machine Corporation
Dept. X, 4545 So. Western Blvd.
Chicago 9, Ill.

Send me Bulletin GMA on Foote Bros.-Louis Allis Gearmotors.

Name.....

Company.....

Position.....

Company Address.....

City.....*Zone*.....*State*.....

We make them

as if we were going to use them

Precisely controlled heat treating is just one of the steps taken at Accurate to assure adherence to your specifications.

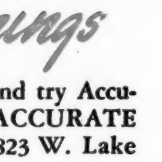
. . . and it lowers

the overall cost of your springs

HERE at Accurate we make springs the way we'd like to have them made for us if we were the user. We believe this guarantees you the best possible springs —uniformly RIGHT springs that permit maximum assembly rates and reduce the number of rejects due to faulty operation. It all adds up to lower manufacturing costs and better product performance for you.

Plan now to find out more about Accurate spring service and try Accurate on your next job. ACCURATE SPRING MFG. CO., 3823 W. Lake Street, Chicago 24, Ill.

Ask for your free copy of the new revised Accurate Handbook of Technical Data on Springs. This booklet has been out of print for some time and if you have previously asked for a copy and have not received it, we would appreciate your asking again.

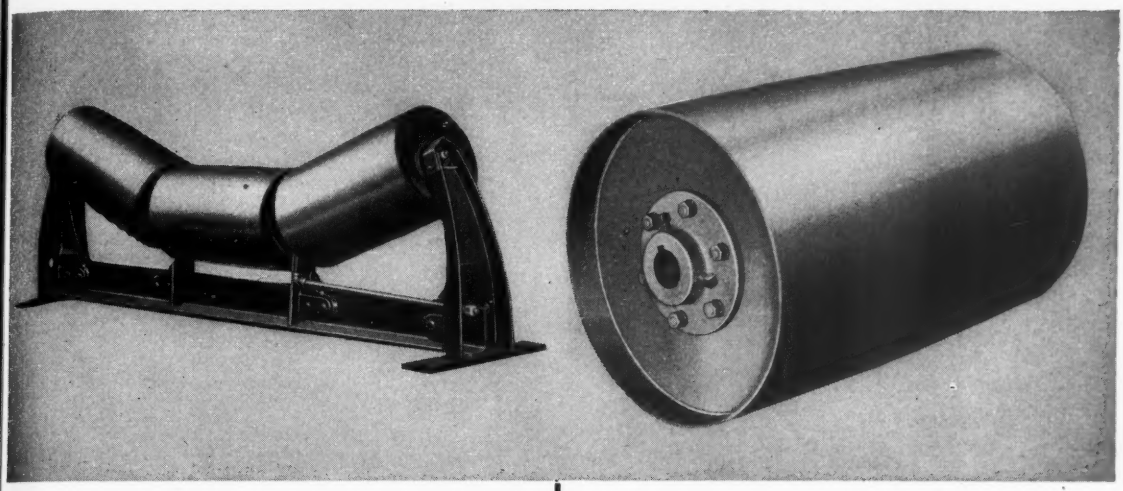


Be sure the springs you buy are Accurate

Accurate Springs

Springs
Wire Forms
Stampings

How Belt Conveyors by LINK-BELT
cut your handling costs



LINK-BELT Idlers require minimum lubrication and adjustment

BY MINIMIZING maintenance . . . holding "down-time" to a new low . . . reducing power requirements — Link-Belt Roller Bearing Idlers save you money.

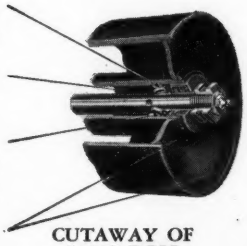
And, because of standardized design, Link-Belt gives you the famous "100" Idler or the heavy-duty "200" Idler at a cost lower than you'd expect. You can choose from the full Link-Belt line of troughing, impact-cushioning, belt training and flat belt idlers in a wide range of roll diameters and belt widths. A complete line to meet any requirement.

Grease-in dirt-out, cartridge type unit seal preserves lubricant. No springs, no loose parts, no sliding metal-to-metal contact.

Large grease reservoir prolongs lubrication intervals.

Precision roller bearings maintain alignment.

Concentrically counterbored and journaled full-length central tube and counterbored roll shell are continuously welded to dished heads to maintain balance and bearing alignment.



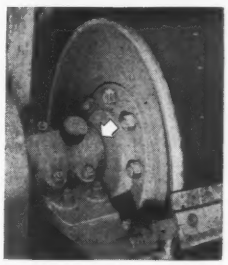
CUTAWAY OF "100" ROLL

LINK-BELT Welded Steel Pulleys minimize shaft deflection

MODERN Link-Belt welded steel design gives you lower maintenance and longer pulley life in more ways than one. Water- and dust-tight construction preserves balance, halts corrosion. Removable hubs — key-seated in line with two set-screws — are interchangeable with many other shaft sizes.

And for reducing shaft deflection (see below), you can't possibly get better protection than with Link-Belt Welded Steel Pulleys.

Since shaft bending moment increases in proportion to the distance between shaft bearing and pulley hub, it's easy to see why Link-Belt Welded Steel Pulleys are your best bet. Note how the bearing support and hub of the pulley are mounted with medium clearance. That's possible because Link-Belt hubs are flush with the pulley face.



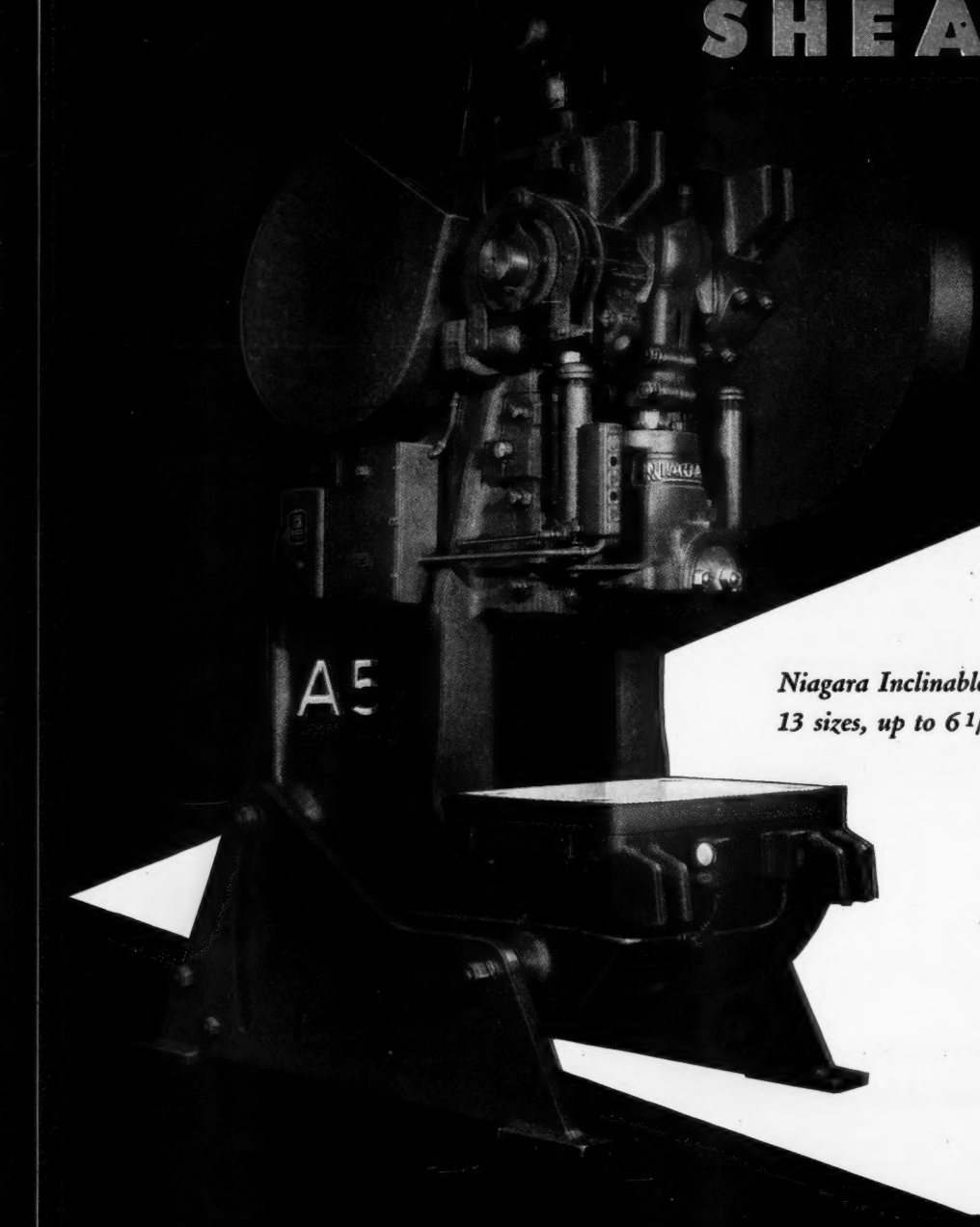
BELT CONVEYORS

LINK-BELT COMPANY: Chicago 9, Indianapolis 6, Philadelphia 40, Atlanta, Houston 1, Minneapolis 5, San Francisco 24, Los Angeles 33, Seattle 4, Toronto 8, Springs (South Africa). Offices, Factory Branch Stores and Distributors in Principal Cities. 12,534

LINK-BELT

NIAGARA

PRESSES AND SHEARS



Niagara Inclinable Presses.
13 sizes, up to 6 1/2 inch shafts.

NIAGARA MACHINE AND TOOL WORKS, BUFFALO 11, NEW YOR

for Defense Production

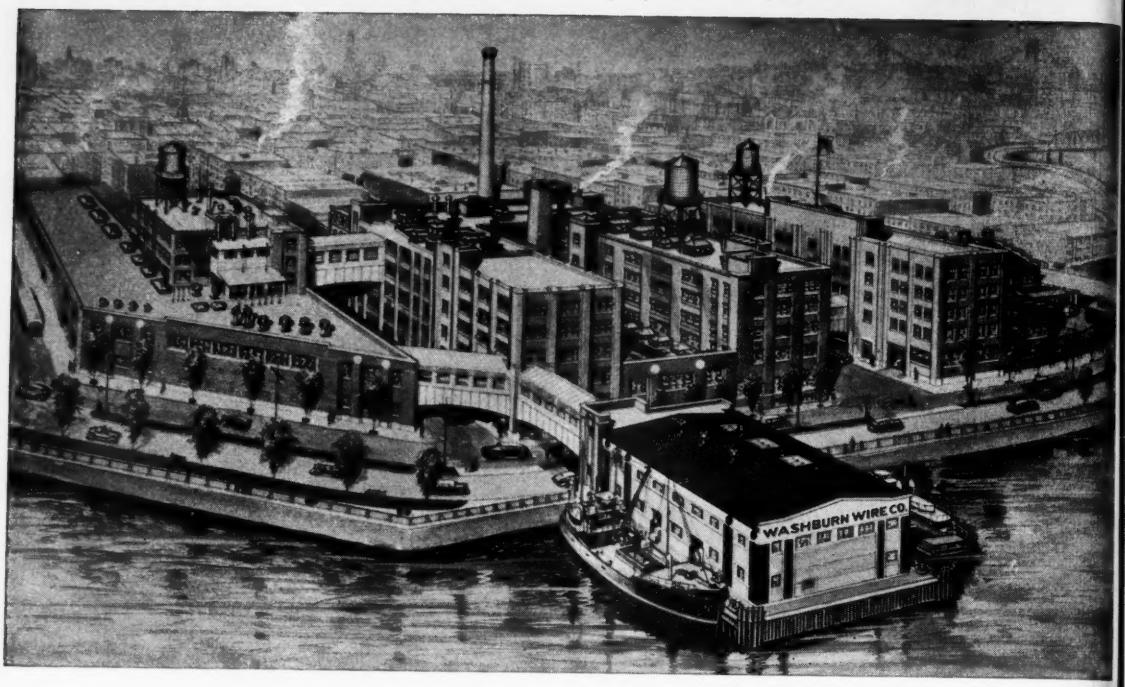
• The sound engineering and long practical experience, incorporated in the design and construction of Niagara Presses and Shears, pay dividends in increased production and low maintenance cost . . . two essentials in the defense program.

Write for Bulletins

Manufacturers of a Complete Line of Sheet Metal Working Equipment Ranging from Small Hand Tools up to Large Power Operated Machinery.

Niagara Power Squaring Shears. Capacity from shim stock up to 1 inch thick steel. Lengths 3 feet to 20 feet.

DISTRICT OFFICES: DETROIT, CLEVELAND, NEW YORK



New York City Plant

WASHBURN WIRE CO.

NEW YORK CITY
and
Phillipsdale, Rhode Island

CLEAN, UNIFORM BILLETS - STRIP - RECTANGULAR, ROUND, FLAT RODS
TEMPERED AND UNTEMPERED FLAT AND ROUND HIGH CARBON WIRES

What Type Preservatives Must I Use?

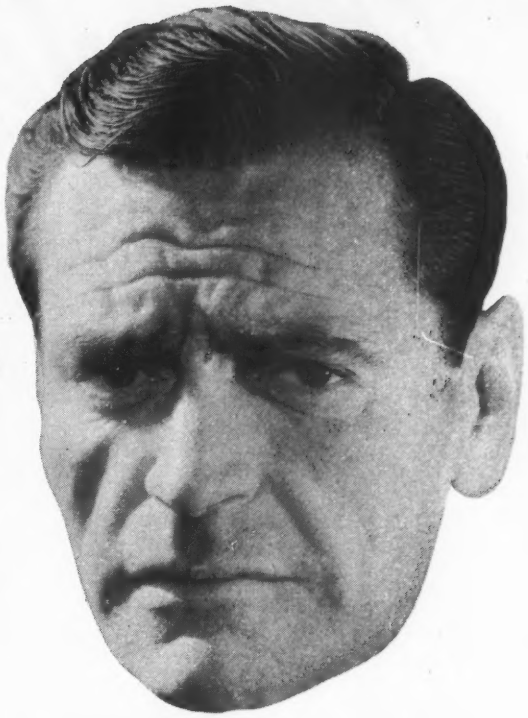
How Do I Apply Them?

How Much Do I Need?

Is a Carton Overwrap O.K. Here?

What Barrier Materials Are Necessary?

What Forms Do They Come In?



questions about packaging?

Dearborn has the materials . . . knows the methods

If you have a government contract and need assistance in packaging your products to government specifications, see your Dearborn packaging engineer.

Dearborn supplies all the government specified materials, including rust preventives, wrappers and sealers, case liners, fingerprint neutralizers. **But, more important to you, Dearborn packaging engineers will visit your plant, plan your packaging procedures to insure your products against the threat of corrosion.**

This is a service that is available to any manufacturer with a packaging problem—and particularly designed for you with government contracts for export shipment. The coupon is for your convenience.

DEARBORN CHEMICAL COMPANY
Merchandise Mart Plaza • Chicago 54, Illinois

This booklet will help you

The new edition of "Preventing Corrosion in Export Packaging" gives you: (1) current government specifications; (2) cleaning methods; (3) approved packaging methods; (4) how to apply rust preventives; (5) how to wrap, seal and dip parts; and (6) other valuable information with step-by-step picture stories. Write for it today.

Dearborn Chemical Company, Dept. S
Merchandise Mart Plaza, Chicago 54, Ill.

☐ Please send a copy of "Preventing Corrosion."

☐ Have a Dearborn Packaging Engineer call.

Name.....

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City.....*State*.....

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NO-OX-ID
IRON + = RUST

THE ORIGINAL RUST PREVENTIVE

Muscle FOR MOUNTAIN

The famous big yellow machines built by Caterpillar Tractor Co. are accepted as the last word in efficient earth moving machinery the world over. The reason—Caterpillar designs and builds ruggedly but thoroughly—quality is their "watchword." Caterpillar knows the importance of efficient materials handling equipment required to produce quality "Cats" at competitive prices. Their modern plant at Peoria, Illinois, is a thorough institution of material handling efficiency.

The Powell Pressed Steel Co. is happy to have had a hand in establishing the enviable reputation Caterpillar has attained for product and service throughout the world. Thousands of sturdy Powell boxes are continually at work handling the many and various Caterpillar parts safely and efficiently through production operations and at minimum costs. The record tells the story. Regardless of usage, stored outside or inside, stacked four or five high, handled with lift truck or crane, holding large parts or small—durable Powell equipment has constantly delivered the goods with maximum efficiency.

Modernize by specifying Powell All-Steel Equipment.

Because of the present critical material situation—due to the national defense effort—Powell deliveries are expedited if you can furnish steel. A government D. O. number is essential.

THE POWELL PRESSED STEEL CO

ORIGINATORS OF COLD-FORMED ALL-STEEL

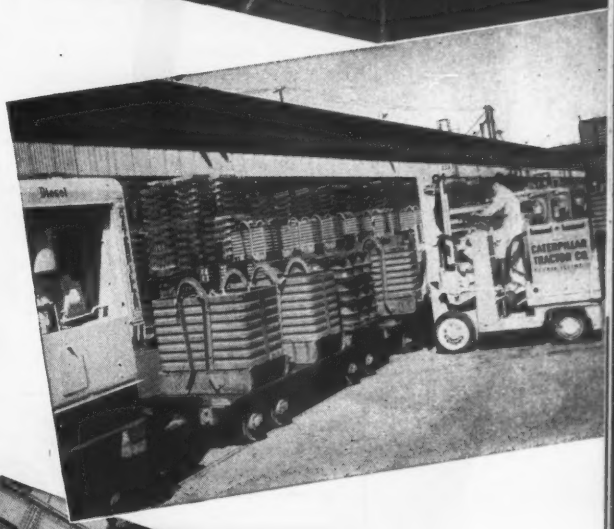
IN GREATER YOUNGSTOWN

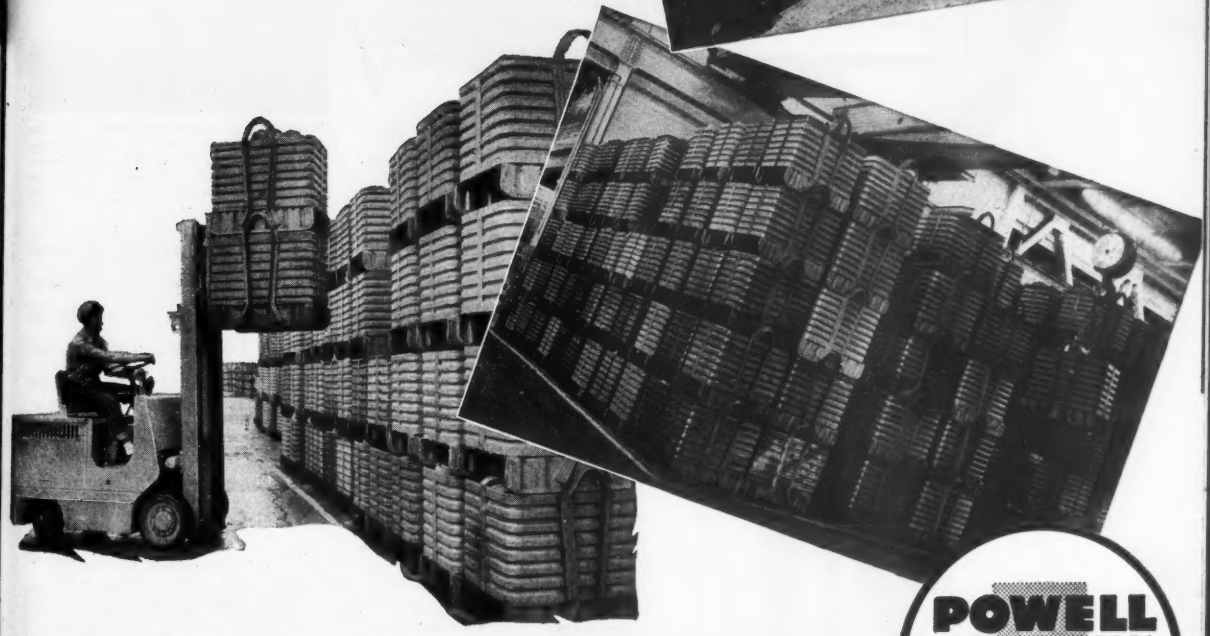
MOVERS...

Like Rugged
"CATERPILLAR" *Machines*

POWELL

All-Steel **HANDLING CONTAINERS**
take the tough jobs in stride





POWELL
PRESSED STEEL
SINCE 1920

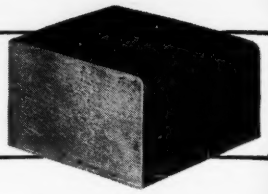
CANY • HUBBARD, OHIO
ALL HANDLING EQUIPMENT
YOWN

SAVE STEEL . . . MANPOWER . . . MACHINING WITH

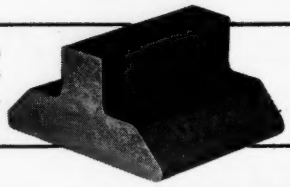
DISSTON® HOT ROLLED SHAPES

How Firestone Tire & Rubber Company saves 45.2% steel in making special jet engine container rims:

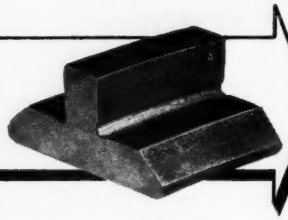
INSTEAD OF THIS—a full-section steel bar weighing 9.86 lbs. a ft....



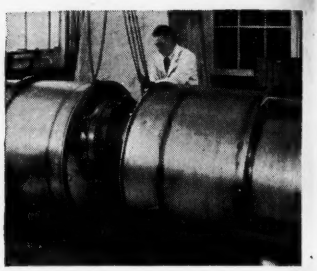
THEY* START WITH THIS—a Disston Shape, hot-rolled to close tolerances, weighing only 5.4 lbs. a ft....



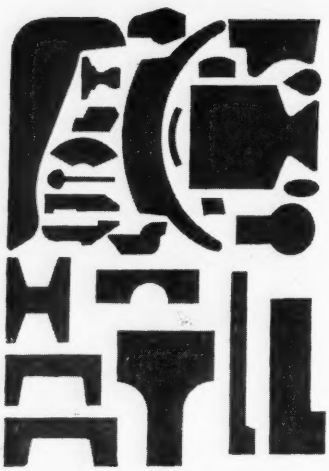
TO MAKE THIS—the finished rim weighing 4.14 lbs. a ft. Only 1.26 lbs. need be machined off each ft. of metal instead of 5.72 lbs.!



*Machining and rim fabrication by Dresser Manufacturing Div., Bradford, Pa.



Firestone's jet engine container is in two halves which are attached by a series of clamps affixed to a machined rim. This rim is made from a special Disston Hot Rolled Steel Shape and helps make a joint capable of carrying structural loads.



A few of the many forms of Disston Hot Rolled Shapes now being used by industry.

This actual case history demonstrates typical savings made for many industries using Disston Hot Rolled Steel Shapes. Such shapes can be rolled in a variety of forms to meet exact specifications. Tolerances are close, and fine finishes can be furnished. These shapes can be made in either alloy or carbon steels, in both electric and open hearth grades. Disston engineers and metallurgists will be glad to work with you in developing the special shapes that will give you the greatest economies. Write us, specifying your needs.

FIGHT WASTE

SCRAP TURNED IN IS STEEL TURNED OUT!

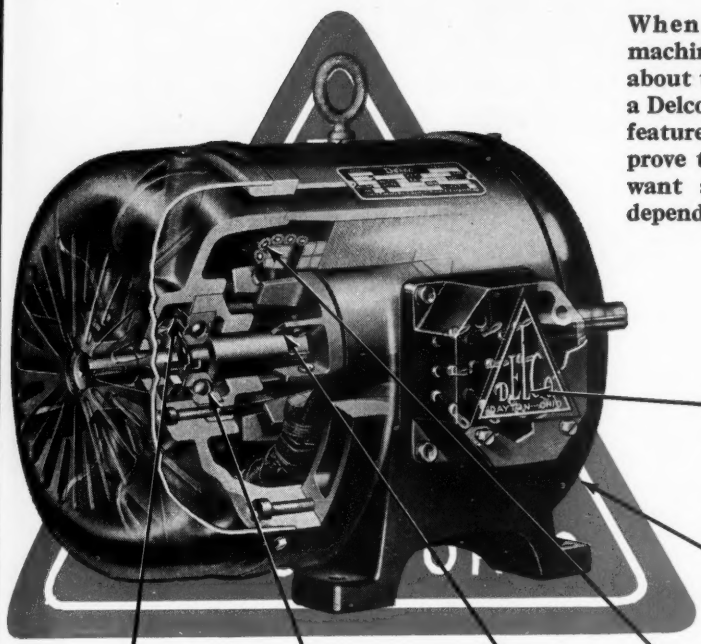
Steel mills urgently need more scrap *now!* Help yourself get more steel by keeping your scrap moving into channels serving steel mills.

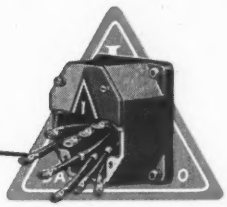
HENRY DISSTON & SONS, INC.

826 Tacony, Philadelphia 35, Pa., U.S.A.

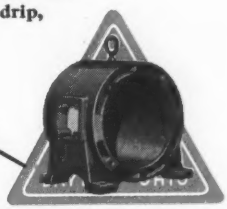
Here's the "INSIDE STORY" on DELCO MOTORS

When you invest in new production machinery, it pays to be just as particular about the motor that drives it. Look inside a Delco Motor. You'll see extra engineering features, extra care in construction, that prove to you a Delco is built the way you want a motor built. Specify Delco for dependable power day in, day out.





WATER-TIGHT CONDUIT BOX
Protects against drip, splash

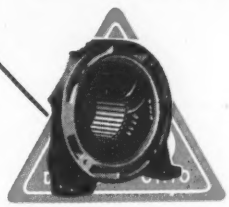


CORROSIVE-RESISTANT CAST IRON FRAME
More solid, more rugged

POSITIONED BEARINGS
Maintain shaft alignment

POSITIVE LUBRICATION
Lengthens bearing life

DYNAMICALLY-BALANCED ROTOR AND SHAFT ASSEMBLY
Reduces vibration, wear



DELCOTE COIL INSULATION
Over and above NEMA specifications

"DELCO PREFERRED"
—because Delco Delivers

Open and enclosed motors for most industrial applications in sizes up to 100 horsepower for standard foot mountings. NEMA C&D flange-mounted motors available in sizes through 30 horsepower. Get in touch with Delco Products, Dayton, Ohio . . . or any sales office listed below.

DELCO MOTORS

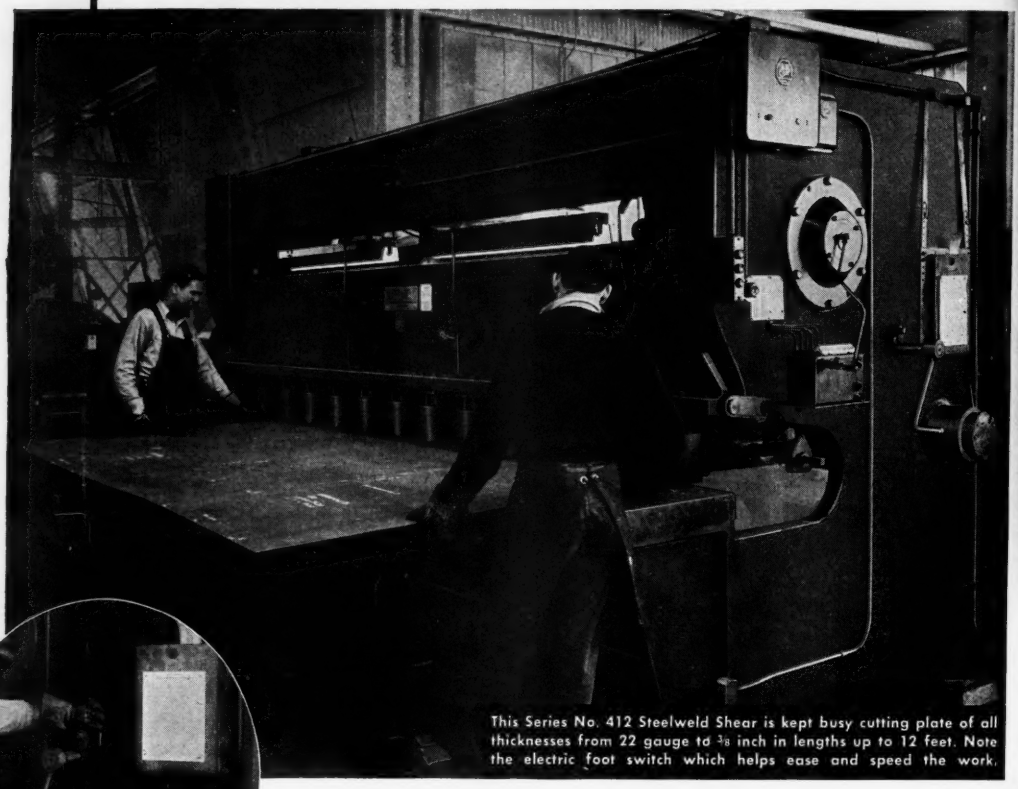
DELCO PRODUCTS

Division of General Motors Corporation, Dayton, Ohio

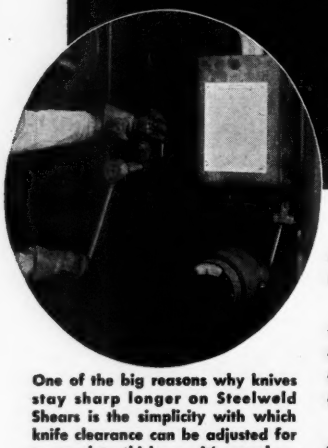
SALES OFFICES: Chicago • Cincinnati • Cleveland • Dallas • Detroit • Hartford • Philadelphia • St. Louis

ALSO AVAILABLE THROUGH DELCO MOTOR DISTRIBUTORS

KNIVES STAY SHARP LONGER fo
California Steelweld Shear Use



This Series No. 412 Steelweld Shear is kept busy cutting plate of all thicknesses from 22 gauge to 3/8 inch in lengths up to 12 feet. Note the electric foot switch which helps ease and speed the work.



One of the big reasons why knives stay sharp longer on Steelweld Shears is the simplicity with which knife clearance can be adjusted for every plate thickness. It's merely a matter of turning a hand crank until the gauge pointer is on the proper figure. No bolts to loosen. No need of a feeler gauge.

"It's a shame," said the shop foreman at Stephens-Adamson Mfg. Co., Los Angeles, California, "but since installing our Steelweld Shear the knife-sharpening man has been crying because we have no work for him."

After months of continuous operation, eight hours a day, usually six days a week, inspection of cut pieces indicates the knives are practically as sharp as new. Parts cut have no burrs and are straight and true. Even when the cutting edges of the knives finally become dulled, there are three more cutting edges ready for use as all four corners of each knife are prepared for shearing.

Stephens-Adamson like their Steelweld Shear and are happy over its operation. It plays an important role in the manufacture of screens, elevators and conveyors which are the principal products of this large West-coast plant. In their words, it is "heavy, well built and dependable. We know it is reliable and always ready to handle our work from day to day."

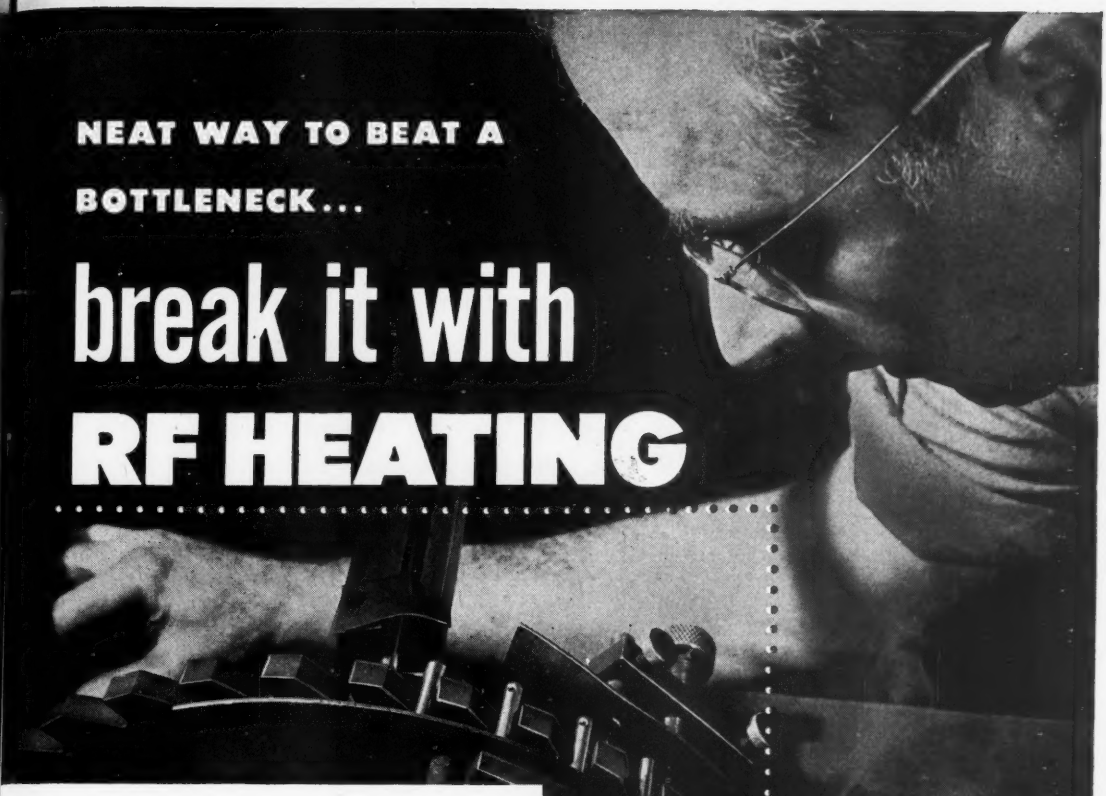
GET THIS BOOK!

CATALOG No. 2011 gives construction and engineering details. Profusely illustrated.

THE CLEVELAND CRANE & ENGINEERING CO.

7817 EAST 282nd STREET, WICKLIFFE, OHIO

STEELWELD PIVOTED BLADE SHEARS



NEAT WAY TO BEAT A BOTTLENECK...

break it with RF HEATING

Here are facts that "talk turkey" to the alert businessman who must heat more metal products ***faster, cheaper, more efficiently.*** Take the production headache of the Whitney Chain Company, Hartford, Connecticut . . . now that was a tough one!

For years, Whitney used a lead-pot setup to anneal the ends of sprocket chain pins — hand dipping them ***one end at a time.*** Smashing this production bottleneck called for a reliable source of fast, efficient, selective heat. And they got just that with three Westinghouse 20 KW 450 KC RF units, each supplied with indexing ferris-wheel type work-handling equipment. Result . . . ***working only part-time, one operator can turn out 10 times the old production rate!*** What's more, RF Heating improved product quality, cut cost of production and material handling. All this with trouble-free operation.

If you're interested in production savings like these, send for our new booklet B-4782, "Induction Heating . . . The Machine Tool That Makes Tall Stories Come True." Call your Westinghouse representative or write to Westinghouse Electric Corporation, Dept. S-8, 2519 Wilkens Avenue, Baltimore 3, Maryland.

YOU CAN BE SURE... IF IT'S

Westinghouse

INDUSTRIAL HEATING

J-02223

How Bliss Met Revere's Tough Rolling Mill "Specs"

Smooth-surfaced non-ferrous strip to exceptionally accurate, uniform gage...quick, precise adjustment during rundowns...variable, fast rolling speed ...extreme versatility throughout...those were requirements for three new rolling mills that Revere Copper and Brass put up to Bliss.

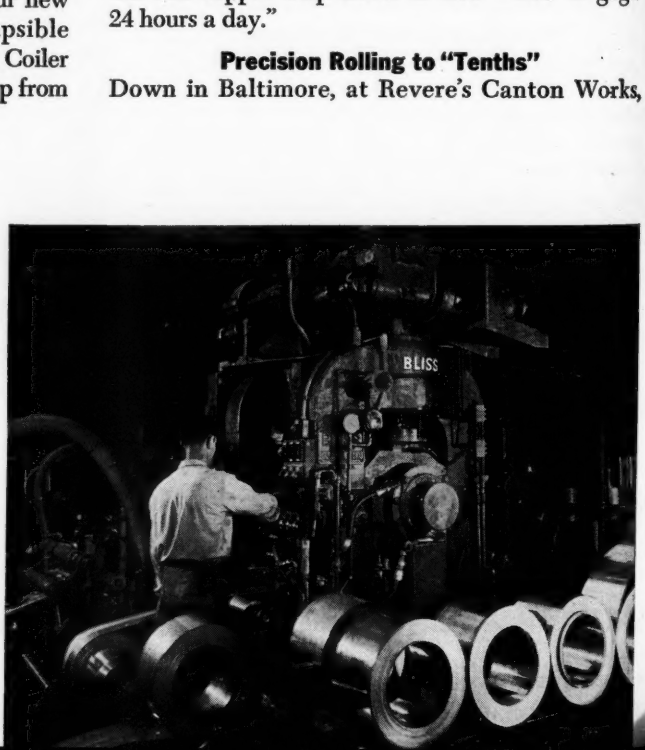
"We knew what we wanted," says H. A. Ray, Assistant Plant Engineer at Revere's New Bedford Works, "and Bliss was able to deliver. On our new intermediate rundown mill there's a collapsible block with vertical-type wrapper with an Up Coiler for heavier gage. We use the Up Coiler for strip from about .125" down to .060"—then we use the block for metal down to .016". This arrangement is compact, and I can tell you it's efficient.

"Another thing we like is the air-operated sticker guide that Bliss developed to meet our various width requirements. On our new finishing mill, they gave us air-operated side guides immediately adjustable to handle any width we're running. On that mill, we can roll copper strip down to .005"—true to gage 24 hours a day."

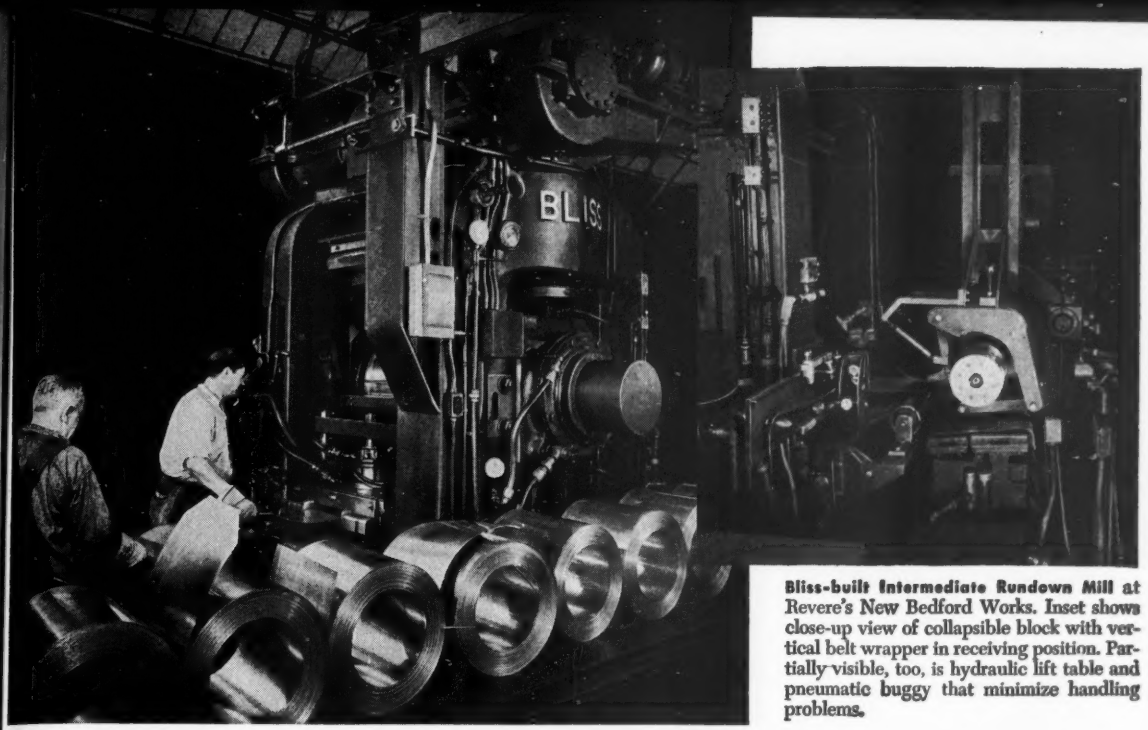
Precision Rolling to "Tenths"

Down in Baltimore, at Revere's Canton Works,

"Old Faithful"—This 14" and 29" x 30" 4-high mill for 1st rundown of copper and copper alloy strip has seen continuous service in Revere's New Bedford plant for over 17 years.



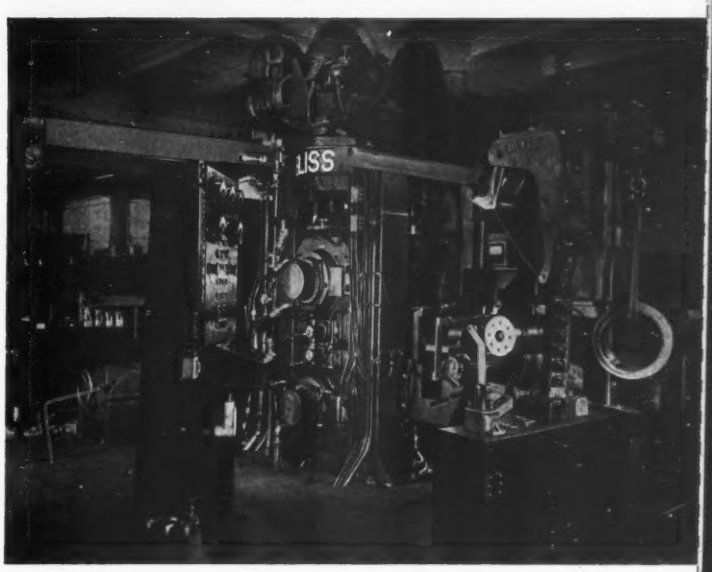
Finishing Mill at New Bedford Threads Up. Note the sleeve handling mechanism at the receiving end. Here, too, is another Bliss original—the air-operated sticker with adjustable air-operated side guides to rapidly handle different coil widths.



Bliss-built Intermediate Rundown Mill at Revere's New Bedford Works. Inset shows close-up view of collapsible block with vertical belt wrapper in receiving position. Partially visible, too, is hydraulic lift table and pneumatic buggy that minimize handling problems.

there's an even more spectacular story. Here Revere precision-rolls copper strip to .012" *within* .0002"—using a Bliss-built mill specially engineered for the job. There's variable, synchronous tension on pay-off and wind-up reel to assist in rundown, and instantaneous control of tension, winding speed and screw-downs from roller's centralized control panel. It's smooth-surfaced strip—double-checked with X-ray Thickness Tester and air micrometers.

Yes, for the engineered refinements that make for maximum production—for the rolling mill performance you want, put your problem up to Bliss. You'll get the same keen counsel that's made Bliss the first name in presses for more than 90 years.



"Tape Mill" at Canton Works in Baltimore—designed for precision-rolling of copper tape for coaxial cable to gage .012" within .0002". X-Ray Thickness Tester mounted on exit side gives constant gage indication and roller's control panel permits immediate correction of adjustment during rolling to hold tolerance.

E. W. Bliss Company

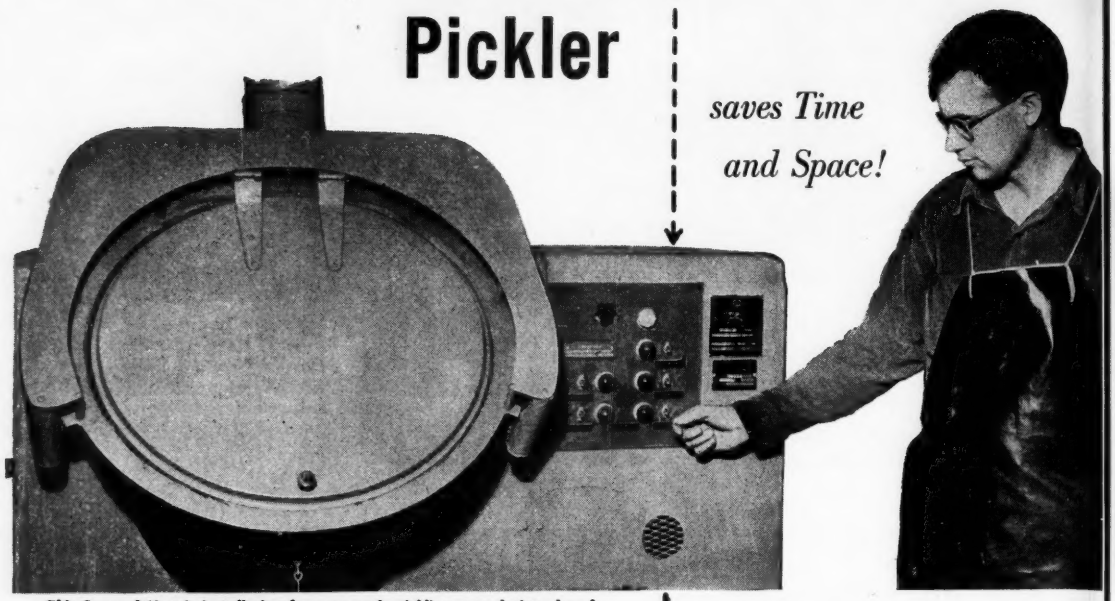
General Offices: Canton, Ohio

Rolling Mill Division

Salem, Ohio

Push-button Pickler

saves Time and Space!



This General Electric installation for automatic pickling was designed and built by the American Machine and Solvents Co., New York, N. Y.

Portable and with easily adjusted controls, this equipment is adaptable to changes in production flow.

A new type of pickling machine is saving time, labor, and other operating costs for the General Electric Company, Schenectady, N.Y.

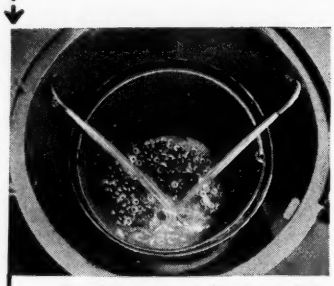
The pickler was specially designed to fill that company's need for an automatic pickling unit for small parts.

The unit is completely automatic and is operated by a series of easily adjusted timer switches. At the end of a cycle of rinses and muriatic acid baths, the machine automatically stops and sounds a "finish" signal.

It is compact (about the size of an office desk), and is easily moved from place to place.

All parts of the unit subjected to abrasion or pickling solution are made of high-strength, corrosion-resistant Monel®. The designers chose Monel because of its long life under severe impacts and hard usage, *even when used in relatively lightweight cross-sections.*

Today, much Monel is being diverted to defense applications. However, for present needs or for future equipment, you can learn more about Monel's use in pickling by writing for your copy of "5-Way Savings in Pickling."



Revolving Monel basket gently tumbles the parts while the machine takes them through a sequence of baths and rinses.

For help in specific pickling applications, you can always get advice from Inco's Technical Service Section.

MONEL... FOR MINIMUM MAINTENANCE

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THE INTERNATIONAL NICKEL COMPANY, INC.
67 Wall Street, New York 5, N.Y.

August 27, 1951

A Help, but—

The new order that for the fourth quarter will give warehouses 100 per cent of the steel they received in their base period should help small-lot buyers (p. 43). But all is not yet serene in the warehouse situation. Among the factors that promise to keep the jobbers' last-quarter steel supplies tight is this: Machine tool builders—important warehouse customers—have the right to place orders up to 140 per cent of what they received in the base period although the warehouseman's receipts are limited to 100 per cent of base period tonnages.

Bigger Subcontracting Chance

Watch for a spurt in machine tool subcontracting now that builders have won price increases (p. 43). A move to encourage farming out of work has just been taken by American Society of Tool Engineers which through its 19,000 engineer-members is trying to find plants with idle machines and manpower that can build machine tool parts at least, if not complete machines. Much of the planned expansion in machine tool output will have to come through subcontracting, and builders are certain to become an increasingly important source for defense subs.

Machinery Output May Slip

Production of most types of machinery—except machine tools—will probably drop in the second half from the feverish first-half pace. That means that output will still be high, substantially above most periods since the end of World War II. Reasons for the expected decline are primarily materials and labor shortages and the uncertainties about how much expansion Washington will allow industry and how the five-year tax amortization policy will be managed from now on.

Trouble in Prices

When machinery production slips, the manufacturers will have more trouble with price ceilings if the current regulations hold. The builders believe that the present setup is bearable only under conditions of full operations. Once even a small amount of capacity becomes idle, unit production costs rise and the narrow margin between profit and loss disappears.

Ambiguities in Capehart Measure

Keep fingers crossed for a favorable OPS interpretation of the ambiguous Capehart Amendment to the Defense Production Act of 1951. If interpreted one way, the amendment would solve many a pricing problem because it would entitle practically every producer of processed and manufactured goods to apply to OPS for permission to include in his costs all but "unreasonable and excessive" increases in expenses which have arisen between the outbreak of the Korean war

Production-Engineering News—p. 71 *The Market Outlook—p. 121*

and July 26, 1951. OPS is considering the question. Chances are only fair for a liberal interpretation. President Truman doesn't like the amendment; it's one of the things he wants changed in his proposed revisions of the price control aspects in the 1951 defense act.

For a Saving in Paper

OPS is also considering permitting a filing technique that would cut down on the paperwork required under CPR 30, the machinery pricing order. One of the most persistent complaints to OPS about CPR 30 is the mountainous reporting job it entails, and the agency will at last offer remedies. Expect action soon.

Unofficial Merger

NPA and DPA will not officially merge even though the same man, Manly Fleischmann, is the administrator of both. But unofficially, the two controls agencies are beginning to function as one. The way that appropriations for the two groups have been set up is one reason why the official merger can't take place. About 5500 people are now working for both NPA and DPA. They're doing a job similar to that accomplished by 22,000 under WPB in World War II. Mr. Fleischmann hopes that his agencies will never have to employ more than 6000.

More Stress on Dispersion

Expect greater emphasis on plant dispersion from now on. Some provision to foster greater dispersion may be worked into the five-year amortization policy once the moratorium on the granting of most certificates of necessity is lifted in mid-October. Aside from that, the government's fostering of such dispersion will be indirect—appeals to common sense in locating new plants as far from existing facilities as practical to minimize the danger of bombing damage.

Straws in the Wind

The Salary Stabilization Board has ordered a freeze on executive bonus and profit-sharing formulas, but has not ruled out the possibility of individual increases later . . . The Armed Services procured $45 million worth of hand tools in the fiscal year ended June 30, 1951 . . . The aircraft industry has let more than 170,000 orders or contracts to about 60,850 subcontractors and suppliers . . . Congress has passed an unusual resolution welcoming the foreign metallurgists who will attend the World Metallurgical Congress in Detroit in October.

What Industry Is Doing

About 80 million pounds of high alloy steel castings will be sold in 1951, compared with 46 million in 1950 (p. 44) . . . One segment of metalworking benefiting from the scrap shortage is that which makes scrap handling equipment; sales are up 50 to 100 per cent over a year ago (p. 45) . . . High demand, government wrangling and materials and labor shortages may extend industrial furnace deliveries still further (p. 46) . . . Makers of counters are counting up a big increase in business (p. 47) . . . Technological development hangs on adequacy of administration, as well as skill of technicians (p. 54).

NEW LINCOLN PLANT CREATED BY INCENTIVE-INSPIRED CO-ACTION IN DEVELOPING POSSIBILITIES IN PRODUCT

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STEEL DESIGN SAVES MATERIALS AND MAN-HOURS ... CUTS COST 60%

WHEN a design utilizes the economies of welded steel, it can be produced for less cost because:

With welded steel, material costs are less. Only 50% to 25% as much metal is required. And, pound for pound, steel costs 75% less, giving an initial 7-to-1 cost benefit with which to start your designs.

With welded steel, fewer man-hours are needed for fabrication regardless of quantity produced. Smaller lots can be manufactured economically using simple tools. As quantities increase, designs can be modified further to replace some welding with bending, thus further reducing production costs.

Wherever costs with steel designs are higher, invariably the designs have fallen short of achieving the ultimate in savings possible with arc welding, or the products have been "over-designed." A restudy of every design by production engineers, before it becomes "frozen" for manufacture, helps eliminate costly details.

Your Lincoln Welding Engineer will gladly assist in analyzing your product requirements to cut costs.

Fig. 3—Uses Sheared Steel Strip *to cut 10% from production costs, as compared with Fig. 2. Requires only simplest of fabricating equipment. Weight is 3 pounds . . . costs 54¢.*

Fig. 4—Saves 16% Cost *over Fig. 2 by replacing tubing with simple "U" formed from bent steel strap. Holes are prepunched prior to welding. Weighs 2½ pounds . . . costs 49¢.*

Fig. 5—Steel Stamping *from light gauge metal is formed in a die and welded. Weight is cut to 2 pounds . . . cost to 22¢ . . . a saving of 62% over Fig. 2. Saves 85% over Fig. 1.*

the ACTUAL

Fig. 1—Original Design. *Machine clevis weighs 7 pounds . . . requires drilling, boring, reaming and spotfacing operations. Costs $1.45 for material and labor.*

increasing the YIELD

Fig. 2—Welded Design Saves 60% Cost. *Fabricated from tubing and steel strap. Needs only fast, simple punching operation. Weighs 3¼ pounds . . . costs only 58¢.*

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Out of Control

Appearing before the Senate Committee on Finance, Elmer B. Staats, assistant director of the Bureau of the Budget, gave this clear-cut statement of actual and proposed government spending: "In the fiscal year 1951, appropriations and authorizations already enacted amounted to $80.6 billion. Expenditures for 1951, however, will be about $44.5 billion. Requests for new obligational authority for 1952, most of which are now before Congress in the major appropriation bills, will be between $90 billion and $100 billion. In 1952, the estimated expenditures of $68.4 billion are again less than the authorizations requested."

This means that Mr. Truman, as chief executive officer of the business of government, is asking Congress (his board of directors) for authority to spend up to $100 billion in fiscal 1952. This is close to the total sales of all companies in the metalworking industries in 1951—about $102 billion.

Imagine that all metalworking companies—iron, steel, nonferrous, electrical machinery and equipment, other machinery, automobiles and equipment and transportation equipment other than autos—were merged into one gigantic corporation. Consider how carefully the chief executive of this hypothetical business enterprise and his associates would prepare its budget. Consider also how painstakingly the directors, representing stockholders, would scrutinize every request for authority to spend. Executives and directors alike would go to great lengths to make sure of a fair return for every dollar spent.

No such concern for economy inhibits the chief executive of our government's business and it is rare among members of Congress. Undoubtedly Mr. Truman exercised much more care in buying shirts and socks for his haberdashery than he does in asking for untold billions for mobilization or foreign aid. Many wives of senators and representatives haggle more over week-end food purchases than do their husbands over bills authorizing tens of billions of dollars.

The inescapable conclusion is that government business has become so large and complicated that proper control of it has passed from the hands of those responsible for it. Congress should dust off the non-partisan Hoover reports, adopt their principal recommendations and work hard to regain control of government business.

E. C. Shaner

EDITOR-IN-CHIEF

LOTS OF ROOM AT TOP: Research is becoming a big business in the United States. It is estimated that in 1939 industry and the government spent $260 million for research work. In 1951 expenditures will total $2 billion, of which $700 million will be financed by industrial corporations and $1300 million by the government. A substantial portion of the govern-

ment's research will be farmed out to private companies.

This rapid increase of more than seven-fold in 12 years has created many problems. One of the most challenging is that of developing managerial personnel to direct research work. Today about 15,000 of the 300,000 persons engaged in research activities are in management jobs. This is a ratio of 5 per cent. Many experts think it is too low.

Apparently the ideal man for research management is one who has a background in technology and research and possesses executive ability, particularly in handling individualistic engineers and scientists. There is lots of room at the top for men who can develop these qualifications. —p. 54

* * *

MAKE DOLLARS COUNT: One phase of Point Four calls for increasing investments by American corporations in backward countries. National Industrial Conference Board has queried hundreds of companies on this point and the replies are discouraging. Obstacles in the form of crippling taxes imposed by our own and foreign governments, exchange difficulties, trends toward nationalization, etc., are formidable.

Another phase of Point Four is aid under Dr. Henry G. Bennett, technical co-operation administrator for the State Department. His program is simple. American "know-how" shows the poor peasant that he can do twice as much work with a hoe as with a crooked stick. The peasant's government buys a hoe for him. His agricultural output is doubled. This costs the United States $84 million or less than 50 cents a head.

How about crawling along on this inexpensive, worth-while aid and sidetracking futile grandiose Point Four schemes until we can catch our breath! —p. 53

* * *

LET'S BAN WRANGLING: A fair idea of the problems confronted by many manufacturers can be gained from the experience of builders of industrial furnaces. Their present plight stems from four causes: 1. Demand for furnaces is as much as five times greater than in 1950. 2. Government agencies are quarreling over who should get the available output. 3. Materials shortages are so severe that production in the last-half of this year will not exceed 70 per cent of that of the first half. 4. Shortages of skilled labor and engineering personnel are hampering operations.

Little can be done immediately about demand and shortages of materials and manpower. These are far-reaching problems which must be sweated out in the time-honored hard way. Wrangling among government agencies is a man-created situation which could and should be ironed out at once by proper organization and proper delegation of authority. —p. 46

* * *

NO SERIOUS LET-DOWN: For decades it has been customary to expect a moderate let-down in the activity of the metalworking industries in July and August. Today, with our much more liberalized vacation-with-pay contracts and with an increasing number of companies indulging in mass vacations in either of the two months, it would be logical to expect a noticeable decline in activity.

Actually the slip-off in July is being compensated by unexpected gains in August. Automobile output is recovering from low weekly and monthly figures. Steel ingot output remains at better than 100 per cent of capacity. Electric power output touched a new all-time high in the week ended Aug. 18. Petroleum production is high and coal output is not too far below last year's level. All in all, industrial activity is holding to a remarkable level, considering the diverse factors involved. —p. 61

* * *

NOW STRETCH FORMING: Design of aircraft is advancing so rapidly that producers of materials and fabricators of parts are hard pressed to keep up with the procession. All of the orthodox processes, such as casting, pressing, forging, welding, riveting, etc. are being challenged.

One of the new requirements in aircraft manufacture is the production of an ever increasing number of parts conforming to compound curvatures. This places a severe strain on orthodox forming methods. It also has brought stretch forming into the picture. This relatively new process has demonstrated two advantages: 1. Accuracy with which complicated contours may be achieved. 2. Low cost.

Stretch forming of sheet metal and extrusions still is in the growing stage. The pressure of an intensified aircraft building program may bring it to maturity sooner than was expected. —p. 76

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Inland's interest in your steel problems does not stop at our shipping dock.
"Let's try changing the blanking direction", said Cliff
Recently, a large automobile manufacturer was concerned with results of a difficult deep drawing operation . . . the fabrication of steel oil pans. These pans were made from Inland's fully aluminum killed cold rolled steel sheets. For six months, these sheets had been ordered to a thickness of .048" and cut to length 35¼" x 43"—and breakage had run to 3.92% of approximately 36,000 oil pans manufactured.
When Cliff Baker*, one of Inland's mill representatives, was given the problem, he suggested changing the blanking direction—inserting sheets in the stamping machine at right angle to the previous direction.
This meant a simple change in the ordering procedure. The customer changed his dimensional specification for these sheets to 43" x 71" so that the direction of rolling and the subsequent direction of steel grain would conform to this suggested practice.
Result: In the following six months, breakage was reduced to 0.75% of 30,000 oil pans fabricated. The number of oil pans scrapped was cut from over 1,400 to approximately 230 in these two six-month periods! INLAND STEEL COMPANY, 38 South Dearborn Street, Chicago 3, Illinois.
*Not actual name
Your scrap is needed by the steel industry for national defense.

NPA Says CMP Snarl Working Out

It believes the problem is not as bad as first thought, so a few order modifications are all that are needed. Industry doesn't take as sanguine a view

NPA IS going to take no drastic action to remedy steel allotments under CMP for the fourth quarter.

The agency doesn't think such moves are necessary. It believes two modifications to existing orders will meet a situation that it claims is not as serious as appeared several weeks ago.

The Other Side of the Coin—Industry, generally, does not take as sanguine a view of the fourth-quarter situation as does Washington, but it is ready to admit that distribution problems are easing up—a little. It is finding that many CMP tickets can be cashed at the third or fourth mill approached, if not at the initial ones. Mills are reporting an increasing number of cancellations from customers who had placed duplicate orders. But there are still steel consumers—not too many and mostly small—who cannot get their CMP tickets cashed.

One "modifying" action is for warehouses. In the fourth quarter they'll get 100 per cent of shipments they received during the base period. (STEEL, Aug. 20, p. 38). That means that monthly allotments in the last quarter will be raised from 425,000 tons to 500,000 tons of carbon steel products. The increase applies to all products.

Modifier—Another NPA modification will come soon to the basic steel order M-1. The revision will permit steel producers to accept a large share of their orders from their established customers and thus insure a more efficient distribution of steel. After they have accepted military orders, steel producers will be permitted to accept or reject controlled materials orders without regard to date of receipt until 15 days prior to expiration of established lead times. Within the 15-day period prior to expiration of lead times, mills would be required to accept and schedule authorized controlled material orders on a first-come, first-served basis.

The proposed authorization for the rejection of orders will apply up to 90 per cent of the present product set-aside reserves. To that extent steel mills still will be required to give first preference to orders for the military, the Atomic Energy Commission, NPA directives, warehouses and producer converters as provided by NPA regulations.

The Reason Why—Advantages of the change, NPA says, are that by holding disruptions of established producer-consumer relationships to a minimum, steel mills will be able to serve their customers more efficiently and reduce cross-shipments and waste.

NPA also has another proposed regulations change in the works. That one will require steel mills to reserve the former free-area steel products for manufacturers of consumer durable goods and automobiles. The action is designed to insure producers of autos and other durables that they'll get steel for fourth-quarter production when they come under CMP.

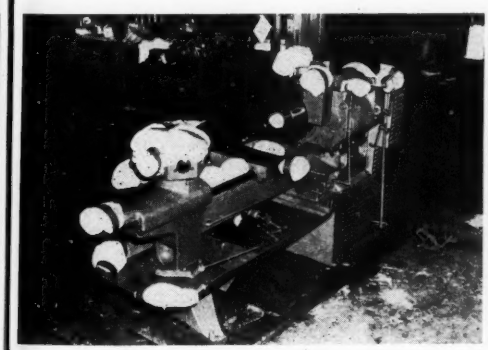
Machine Tool Builders Win Price Fight with OPS

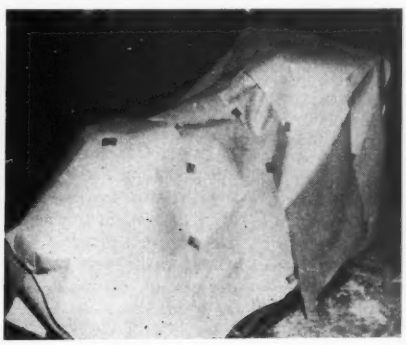
THE NEW OPS machine tool regulation means that builders can increase their base period prices 12 per cent in determining their ceiling prices. Does the order mean a foot-in-the-door for other machinery manufacturers who can expect similar treatment eventually?

In a spot check on that question, STEEL found these answers: From government, definitely no; from industry, probably no, but the ruling at least sets a precedent that will come in handy if any other machinery makers ever find themselves in the machine tool builders' predicament.

First Signs — Initial reactions among machine tool builders to the victory in their seven-month fight for adequate pricing were those of relief. It was generally thought that the action would give incentives to increase production and that the new price ceilings would be fair, both to the builders and the buyers.

The action is covered by Revision 1 to Supplementary Regulation 2 under Ceiling Price Regulation 30, effective Aug. 27. The revision allows manufacturers to reflect in their increased base period prices, increases in most labor and material costs between the end of their base period and Sept. 10, 1951. The time for filing Public Form 8, as required in





PACKAGING PERFECTION: In the first stages of vapor phase inhibitor packing shredded corrosion inhibitor paper in porous cotton bags is stuffed in the gear boxes and other unprotected parts of this machine tool. The bags also serve to cushion edges or protruding parts. In the second step the machine is covered with volatile inhibitor treated Kraft paper. Next, the entire machine is finally enclosed with a vinyl-chloride shroud before it is loaded on a car

PAIN IN THE POCKETBOOK: How individual incomes were affected by corporation taxes was graphically demonstrated by Keystone Steel & Wire Co., Peoria, Ill. Employees there learned firsthand who pays the high cost of government when annual profit sharing checks were distributed. This year's tax sloughed off 58 per cent more of the amount to be shared than would have been taken under last year's corporation tax

the regulation, is extended to Oct. 15, 1951. Those who have already filed that form may recompute their ceiling prices.

Overtime—The revised regulation permits the builder to reflect increased costs due to increased use of overtime and shift premium hours and increased subcontracting since the end of the base period. A manufacturer must make refunds on overestimates of increased subcontracting costs within four months after he has had 12 months' experience. Also, a manufacturer is now permitted to calculate increased costs due to increased subcontracting on the basis of his actual experience. If he does so, no refund is required.

The revision of SR 2 to CPR 30 comes about because of Defense Mobilizer C. E. Wilson's directive to OPS to modify price controls for machine tool makers to the extent necessary to expand production.

NPA Starts Compliance Check

Large consumers of controlled materials—steel, copper and aluminum—in the Cleveland and Detroit areas will immediately undergo a compliance check by auditors of the National Production Authority.

Noting that 1000 firms use 90 per cent of the controlled materials, NPA decided to center its attention on these. As somewhat more than 25 per cent of the 1000 firms are situated in the Ohio, Michigan and Kentucky region, with the bulk of the 25 per cent being in Cleveland and Detroit, the NPA will start in the areas of those two cities to see whether its regulations are being complied with by users of the controlled materials.

Approximately 200 investigators will be used in making the check.

NPA's Director of Compliance John Peckham says corrective adjustments rather than inflicting of penalties are the aim of the NPA. Penalties, however, will be resorted to if necessary in cases of wilful violations.

Strike Closes Bethlehem Plant

Tieup of railroad facilities in the Buffalo area caused Bethlehem Steel Co. to halt all iron and steel production at its Lackawanna plant last week. Six blast furnaces were banked and 28 open hearths shut down. Finishing mills scheduled only limited operations. About 16,000 workers were idle.

The strike—by trainmen on the South Buffalo Railway, a terminal switching road—was causing cutbacks by other heavy industries in the immediate area.

Manganese from Slag

Multimillionaire oilman Richardson wants to finance the Mines Bureau project

WASHINGTON is agog over a new phenomenon—a private citizen undertaking to finance a government project. Central figure in this turnabout scene is Sid W. Richardson, multimillionaire oilman from Ft. Worth, Tex. He has agreed to put up the money to swing the Bureau of Mines' manganese-from-slag project. Talk at the moment involves some indefinite sum ranging between $50 million and $100 million. The venture will be carried out in its entirety under guidance of the bureau.

Procedure—First step will be erection of a small pilot blast furnace. It will charge basic open-hearth slag from furnaces operating with manganese-containing lake ore and will use anthracite coal as fuel. Location will thus be at some slag-producing point like Bethlehem, Pa., or at some anthracite center such as Wilkes-Barre, Pa. Product of the furnace will be spiegeleisen containing 20 to 22 per cent manganese and about 4 per cent phosphorus.

Ten-ton batches of spiegel will be run, in the molten stage, into a 10-ton basic-lined Thomas-Gilchrist converter. There the manganese will be blown out of the spiegeleisen—forming a vessel cinder that actually will be a synthetic manganese ore containing about 60 per cent manganese, less than 5 per cent iron and less than 0.2 per cent phosphorus. The remaining blown metal will be transferred in the molten state to a second converter where it will be blown, with additions of lime to remove the phosphorus, to a low-sulphur, low-phosphorus, open-hearth melting stock of high purity.

Substance—Mr. Richardson proposes to finance construction of this furnace and its operation over a test period of three to four months. If the results are as anticipated, he will proceed to construct plants to smelt the manganese-bearing basic open-hearth slag now going on dumps at the rate of 6 million tons a year. Objective is production from this slag of 400,000 to 500,000 tons of 80 per cent ferromanganese annually.

Scope of the project is seen in plans which call for starting construction before the end of this year on ten blast furnaces with capacity of 1000 tons per day each. Of the ten, seven are to produce spiegeleisen and three standard ferromanganese. The seven spiegel stacks are to be situated where the manganese-bearing slag is

produced. Chicago, Youngstown, Pittsburgh, Buffalo, a point in Eastern Pennsylvania and a point on Lake Erie between Cleveland and Buffalo have been tentatively selected. The ferro furnaces, of course, will be located with reference to the spiegel plants.

Decision—Reason for selecting anthracite as the fuel is its availability. The original plan called for coke, but 630 ovens would be needed.

Handling Scrap Quickly?

There are money savings in scrap handling equipment during the scrapping boom

THE SCRAP shortage is proving a boon to at least one segment of metalworking.

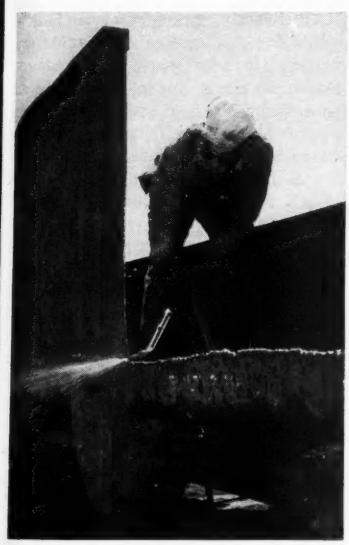
That's a factor boosting gross sales of the 12 or so companies that make scrap handling equipment 50 to 100 per cent above 1950 levels. Scrap handling equipment permits greater and more economic recovery for generators of the material.

Other Elements—The general business boom also contributes to the increased demand for such equipment. The greater need for factory space is still another explanation for the rising needs. Handling equipment that presses, crushes or bales scrap into less space or conveys it out of the way is a godsend to production men, most of whom need more factory area. The major scrap handling equipment includes presses—or balers—shears and turnings crushers. Scrap handlers also need cutting torches, cranes, scales, trucks and conveyors, but that equipment is usually obtained from manufacturers who don't center their attention on scrap handling.

You may generate as little as three tons of scrap a day and still find installation of baling and other scrap handling equipment of economic value. If you generate 20 tons a day, you are practically certain to find a scrap handling installation economical. An average size baling press, with pits, foundation and operating mechanism, costs from $90,000 to $100,000. The money savings in scrap handling equipment come from premiums paid for baled scrap, more economical shipment, savings in plant floor space and economies resulting from mechanical handling.

The Source—Stamping and machining firms with 75 or more workers account for the bulk of the demand for scrap handling equipment. The auto industry is the largest buyer. Much of the newer demand comes from plants which the auto industry is building or operating to produce defense items.

Deliveries on the heavier scrap handling equipment, such as baling presses, range from one to two years. Steel structurals, plates and forgings are hard to get and delay deliveries. Few of the companies making the major scrap handling equipment have more than 2 or 3 per cent of their business going for direct defense purposes.



SCRAP TRAP: Rolling stock from Union Pacific Railroad — hulks of 18,747 worn out locomotives, freight cars, passenger cars and roadway equipment—has supplied nearly 1 million gross tons of scrap iron and steel since the end of World War II. Railroads are an important source of high-grade scrap because they are such large users of iron and steel and because a large proportion of this metal is available for return to mills

High Tide for Pourers of High Alloy Steel Castings

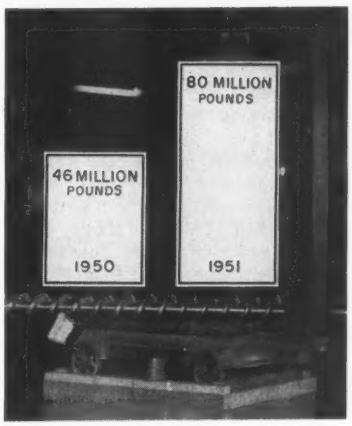
BUSINESS is running high for high alloy steel castings producers.

So heavy is demand for such castings that first half production in the United States totaled 32 million pounds, which is only 14 million pounds less than were turned out in all of 1950. If the foundries can get all of the raw materials they need, their 1951 production should be around 80 million pounds. If this figure is attained, the dollar volume for 1951 will dwarf the $35 million amount recorded in 1950.

Order backlogs average 4½ months. Only a small proportion of these are for direct military work. Most of the demand is for castings for "tools for defense," these being heat treating furnaces, electric power plant requirements, corrosion resistant pumps, valves—in short, anywhere high heat resistance and corrosion resistance are indispensable. Most of the direct defense work is for airplane engines, particularly jet types.

Where They Go—Big end uses of heat resistant castings now are in industrial heat treating furnaces, oil refining furnaces, cement mills and power plants. Major buyers of corrosion resistant castings include the chemical processing industries, oil refineries, food processors, textile manufacturers, dyers and electric power plants.

Heat treaters, the largest users of high alloy steel castings, normally can expect the alloy links, rollers, etc. in their furnaces to last a year, but because of present heavy demands and around-the-clock operation they replace them every six months.



HIGH ALLOY STEEL CASTINGS
. . . promise big production gains

New Market—Growing use of both heat resistant and corrosion resistant castings is in the atomic field.

Whether the foundries can attain the 80-million-pound mark this year depends principally on whether they can get enough alloying materials. These foundries are banking on their essentiality to provide them with enough. Right now they're not so sure how this will work out, for they find they're still being hampered by shortages of nickel, chromium, molybdenum, tungsten and columbium.

Tied Up—One important producer laments that production on 100 tons of castings is stymied for want of molybdenum.

Analyzing its order backlogs, one

foundry says they are about five months on run-of-the-mine high alloy steel castings. Precision high alloy castings made by the lost wax or similar methods are now booked solidly for about two years. Shipments on rough castings are eight to ten weeks. For centrifugally cast high alloy parts the wait is 14 to 16 weeks.

Order backlogs vary with companies. For instance, one foundry may be booked considerably ahead on small squeezer work but have relatively few orders for large castings that could be made on the floor, and hence could provide reasonably early deliveries on the latter. With another company the situation might be the reverse.

Consolidated Installs Pipe Mill

Consolidated Western Steel Corp., fabricating subsidiary of U. S. Steel Corp., will install an electric-weld pipe mill at its Berkeley, Calif., plant to produce thin wall A.P.I. line pipe in sizes ranging from 4½ inches to 8⅝ inches.

Republic Converts Side-Charger

A dividend of about 50,000 tons of steel yearly will be available to the metalworking industry when Republic Steel Corp. converts a 70-ton electric furnace from side door charging to top charging. The furnace will be the second one converted at Republic's South Chicago plant. Transformer capacity on the furnace will be boosted from 12,500 to 20,000 kilovolt amperes.

Expansion Program Advances

Flat-rolled products will be added to Pittsburgh Steel Co.'s line of tubular, wire and semi-finished products with completion of its planned program of expansion and modernization. A new blooming mill and hot strip mill are already under construction, and a cold-rolled sheet mill is on the schedule. The hot strip mill is going up at Allenport, Pa. More than $3 million of General Electric equipment, including mill drives totaling 22,000 horsepower, has been ordered for installation there.

New Facilities for Great Lakes

Additional slab and billet capacity is to be built by Great Lakes Steel Corp. in the Detroit area. For this, the company received a government certificate of necessity, permitting fast tax write-off on 75 per cent of $24,751,126. Completion of the installation is scheduled for January, 1953.

Furnace Troubles

High demand, federal indecision and shortages may extend deliveries of industrial furnaces

DELIVERY of the industrial furnace you have on order may be further delayed because the heat is on manufacturers of that equipment. Deliveries already take five months or longer and are more extended than a year ago.

The shipment situation has arisen mainly because of these four problems plaguing industrial furnace manufacturers: Demand for furnaces is as much as five times greater than in 1950; government agencies are wrangling over who should get the available production; materials shortages are curtailing output to the extent that last-half production won't amount to more than 70 per cent of first half; shortages of skilled labor and engineering personnel are hampering operations.

Industrial Furnace Demand: Five Times Greater Than in '50
(New Orders Placed in the First Halves of 1950 and 1951)

Heated Demand—On the basis of industrial furnace orders placed, requirements in the first half of 1951 were about five times heavier than in the corresponding period of 1950. The latter was about normal for postwar. Demand will probably slacken off in this half, but it will still be in excess of what the builders can accept. This year builders will turn out $60 million worth of equipment.

Some 50 producers turn out 80 per cent of that production, another 15 turn out 15 per cent and 10 smaller companies account for the final 5 per cent of the industry's volume. Builders are resorting increasingly to subcontracting to boost output, but there are limits in that approach.

Wrangling in Washington — The second factor affecting industrial furnace deliveries is indecision in government. About 80 per cent of production is now rated for defense—and it promises to be 100 per cent before long. No one board among the various defense agencies has the power to say who gets the furnaces. So, time-consuming wrangling goes on, and deliveries falter.

Industrial Furnace Manufacturers Association thinks that the "first come first served" rule should hold until a top government agency is given the power to say what defense industries get the equipment first. Rated orders are coming in particularly heavily from steel and brass mills and automotive companies converting to war work. Defense demand is rising most noticeably for equipment to heat treat shells and armor plate. An increasing number of rotary arc furnaces are required for shell forgings. About 40 per cent of all industrial furnaces that will be made this year are electrically heated. About 50 per cent use gas and 10 per cent oil.

On Materials Shortages—The third factor in deliveries is materials shortages. Industrial furnace manufacturers think fourth-quarter steel allocations are "unreasonably low." The allotment may be so bad that many builders will have to reschedule bookings and push forward delivery dates already extended.

Steel plate is the product used in the largest tonnage by furnace builders. By tonnage, angles and channels run second. High alloy castings are the most difficult items to obtain. Links and chains often take six months to get, and delivery dates of up to a year on refractory material are quoted to furnace makers.

On Personnel Scarcities—A fourth problem plaguing the industry is manpower—both skilled labor and skilled engineering. The lack of skilled labor is bad, but not yet crip-

pling. The lack of skilled engineers threatens to become dangerous. It takes about five years to make a furnace engineer out of a graduate engineer. One manufacturer says: "We want more assurances than we now have that our engineers in training won't get drafted into the armed services."

Pipe Induction Welded

Induction heating principle is being adapted to high-speed welding of small size merchant pipe and conduit. The process eliminates the use of furnaces by requiring no heat treatment before or after welding.

The equipment was developed by the Yoder Co., Cleveland, in co-operation with the Tocco Division of the Ohio Crankshaft Co., Cleveland.

Operating speeds range from 165 to 240 feet per minute, depending on size and stock thickness. As in the Yoder resistance-weld process, the pipe is made from coiled strip or skelp which is cold-formed into tubular shape. Basically new is the welder.

The process makes possible use of open-hearth or bessemer hot-rolled strip without necessity of pre-cleaning, pickling or oiling, except for purposes of galvanizing. Another economy results from the ability to use strip slit from multiple width coils and fed continuously into the mill.

Yoder believes the sizes which can most profitably be made by the process range from ½-inch to 2-inch merchant pipe and rigid conduit and electric metallic tubing conduit up to 4 inches. These sizes embrace the pipe commonly used for plumbing, heating, gas and other services.

C.F.&I. Plans Pipe Mill

Colorado Fuel & Iron Corp. will install a $30 million seamless tube mill at Pueblo, Colo.

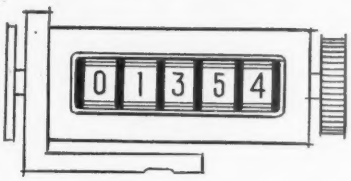
Primary production of the mill will be oil country goods but the pipe will also serve other essential industrial and defense purposes. The plant is expected to be in operation by early 1953.

Instrument Makers Ready Show

Booths are reserved for 143 instrument manufacturers who will show equipment at the sixth annual instrument conference and exhibit Sept. 10-14. The show is sponsored by the Instrument Society of America and is to be held at Sam Houston Coliseum, Houston. J. R. Martin of Humble Oil & Refining Co., member of the Houston host section, is general conference and exhibit chairman.

Counters Record Big Total

Makers of counters and computers have a backlog that is at an alltime high



MAKERS of counters are counting up a big increase in business.

Wherever wheels turn or gears mesh for unit production of goods there is a potential market for counters and computers. With the country's expanding economy and defense program there are more and more wheels turning and gears meshing. So, backlogs of orders for counters are at an alltime high. How quickly, then, can you get deliveries? They vary as to units; some standard counters may be available from stock, but in general, deliveries are extended four to five months.

Countless Sources of Orders—Some of the increase in business stems from need for counting and computing devices in military equipment, but a large percentage of the current demand comes from defense-supporting industries.

Counters and computers are precision products made primarily to give answers as to "how many" and "how much." They become integral parts of machines to count or measure in feet to miles, number of revolutions or stops of anything that revolves, hours of operation, attendance, electrical impulses, time and anything else you may want to record. In many of these uses the counter is of the predetermining type; when an established count is reached on any machine it may be automatically halted or a signal may be flashed. This controls overruns.

A Modest Start—Like many other products that today are highly developed, counters and computers had a modest start—on a bicycle, in fact. When old-timers were peddling bikes around country roads back in the Gay Nineties, distances covered in these two-wheel marathons often meant arguments as to time and miles. A device to measure their jaunts was invented and sold with the slogan "It's Nice To Know How Far You Go." Largely from this grew the present multimillion-dollar industry of approximately six companies producing counters and computers. Another half dozen companies make counters and computers as components for their own products.

Has Its Headaches—The stature to which the industry has now grown is sufficient to give it headaches in procuring enough materials. Insufficient supplies of steel, aluminum, brass, zinc and tin have cost the industry some production. Finding substitutes that will maintain quality and performance is difficult. Speed, temperature and humidity are factors that must be considered in making substitutions. To some extent, magnesium is being substituted for aluminum.

An important component in counter and computer makers' business is locks. They are highly important on preset counters and many others keeping production records where piece rates establish wages. Locks prevent tampering.

Ball bearings also figure importantly in some counters and computers, trends in design being toward higher speeds to match this same trend in most production equipment.

The Leader—Mechanical type counters lead by a wide margin, although electrically operated devices are used frequently for special reasons or where remote recording is necessary. Research in electronic controls is progressing, some being designed to pick up counts in units of hundreds or thousands. Counts of 1000 per minute are common on many units and even standard, while some mechanically and electrically operated devices can perform well above that mark.

Brake, Clutch Demand Up

Sharp increase in demand for electric brakes and clutches growing out of the mobilization program is reported by Steven P. J. Wood, vice president and general manager, Warner Electric Brake & Clutch Co., Beloit, Wis.

Mr. Wood says shipments of electric brakes and clutches for use on industrial machinery and machine tools during the first half of 1951 were more than double the shipments in the same period last year.

Roadbuilders See Rough Going

A critical shortage of steel for highway construction in the third and fourth quarters threatens the nation's roadbuilding program and strong and immediate action must be taken to correct the situation.

So says J. A. Anderson, Richmond, Va., president of the American Association of State Highway Officials, in a report to state highway depart-

CRACK CARRIER: International Harvester Co., Chicago, and Food Machinery & Chemical Corp., San Jose, Calif., are producing this new armored personnel carrier which will take infantrymen to the front lines along with tanks. It is powered by a Continental six-cylinder air-cooled engine and an Allison cross drive transmission. Developed by the Army Ordnance Corps, the full tracked infantry carrier will traverse the same terrain as tanks while protecting its cargo of 12 men from small arms fire and shell fragments. The 20-ton carrier can also be used as a cargo or litter carrier, as a prime mover for towing artillery or as a command post car. It will do 35 miles per hour on improved roads and can turn in its own length and descend 60 per cent slopes, all with full load. The Army has designated it the T18E1

ments. Mr. Anderson believes defense officials fail to appreciate the gravity of the highway situation, pointing out that fourth-quarter allotments of steel for state, county and city use were cut from 300,000 to 250,000 tons.

Even more damaging, he adds, may be the policy that made tentative allocations of large amounts of steel available to other industries well in advance of announcement of fourth-quarter highway allocations. Mr. Anderson fears that as a result mills will be too loaded to consider orders for highway steel in this period.

They'll Look Themselves Over

Where do changes in the Defense Production Act and latest governmental regulations put us?

That's one of the big questions the steel kitchen cabinet manufacturers will get together to talk about on Sept. 12 at Hotel Cleveland, Cleveland. Sponsor of the meeting is the Steel Kitchen Cabinet Institute.

A committee report on advisability of continuing a national organization in the industry is planned.

Back to Plane-Building

Returning to the aircraft industry after a five-year lapse, Kaiser Metal Products Inc., Oakland, Calif., will build wings for the Canberra twin-jet light bomber under a contract with Glenn L. Martin Co.

The aircraft work will not affect Kaiser's normal output of enameled metal products for civilian markets. The company will require an additional 7000 employees at its Bristol, Pa., plant for the new work.

Armed Forces Exhibit Goes to Atlanta Sept. 10-12

SEVENTH EXHIBIT arranged by joint Armed Forces Regional Councils is planned for the Biltmore Exhibit Hall in Atlanta, Sept. 10-12. The show will give small businessmen in the southeastern region an opportunity to see subcontractable components, discuss machine tools and tolerances and go over blueprints with prime contractors' representatives.

Atlanta's exhibit follows the plan developed through similar clinics in New York, Boston, Cleveland, Chicago, St. Louis and Ft. Worth. Manufacturers interested should contact Capt. Donald W. Giles, Inspector of Naval Materiel, 770 Spring St. N. W., Atlanta.

Recent developments in Atomic Energy Commission research indicated progress in the AEC's project to build a nuclear-powered submarine. Now the agency reports the first contract for actual construction has been awarded to Electric Boat Co., Groton, Conn., under authorization received from Congress a year ago. Carelton Shugg, who resigned a post as deputy general manager of AEC last January to become an officer at Electric Boat Co., is expected to head the new program.

A new plant being built at Anaheim, Calif., by Northrop Aircraft Inc., will house manufacture of tank optical range finders, to be made for the Ordnance Corps. Northrop's operation at Anaheim will be separate from the company's main plant at Hawthorne, Calif., where the Air Force F-89 Scorpion is produced.

More government awards, in excess of $250,000, follow. Added to these are Signal Corps awards on which no quantity or value data is furnished.

PRODUCT	CONTRACTOR
Cranes and Attachments	Koehring Co., Port Hueneme, Calif.
Minesweepers	Pacific Boatbuilding Co., Tacoma, Wash.
	Martinolich Shipbuilding Co., Tacoma, Wash.
Fuzes	Easy Washing Machine Corp., Syracuse, N. Y.
Shells & Parts for 75MM Rifle	York Electric & Machine Co. Inc., York, Pa.
Adapters	Fraser & Johnson Co., San Francisco
Air Heaters	Pittsburgh-Des Moines Steel Co., Pittsburgh
Oil Pressure Transmitters	U. S. Gage Div., American Machine & Metals Inc., Sellersville, Pa.
Jig Boring & Milling Machines	Rudel Machinery Co. Inc., New York
Boring Machines	Pratt & Whitney Div., Niles-Bement-Pond Co., West Hartford, Conn.
Fueling & Defueling Units	Highland Trailer Co., Edgerton, Wis.
Tank & Combat Vehicle Spare Parts	Detroit Aluminum & Brass Corp., Detroit
Assembly & Unit Feeders	General Electric Co., Schenectady, N. Y.

No value or quantity data is furnished on the following:

Radio Terminal Sets	ARF Products, River Forest, Ill.
	Utility Electronics Corp., East Newark, N. J.
	Sentinel Radio Corp., Evanston, Ill.
	Emerson Radio & Phonograph Corp., New York
	Hallicrafters Co., Chicago
Radio Terminal Sets	Federal Telephone & Radio Corp., Clifton, N. J.
	Espey Mfg. Co., New York
	Hallicrafters Co., Chicago
	Rauland-Borg Corp., Chicago
Transformers & Coils	Westinghouse Electric Corp., Pittsburgh
	Radio Corp. of America, Camden, N. J.
	Hallicrafters Co., Chicago
Transformers	A. C. Transformer Corp., Newark, N. J.

CHECKLIST ON CONTROLS

GOVERNMENT control orders are digested or listed each week in this "Checklist on Controls." For complete copies of NPA orders, write to NPA Distribution Section, First Basement, New GAO Bldg., Washington 25. For copies of OPS orders, contact nearest OPS district or regional office. For copies of OPS news releases, write David S. Phillips, director, OPS Administrative Services Division, Temporary E Bldg., Washington 25.

Materials Orders

FARM EQUIPMENT — NPA Order M-55 was revoked Aug. 17, 1951, the revocation being effective July 1, 1951. The order, issued Mar. 31, 1951, had authorized farm equipment makers to use a defense order (DO) priority rating to procure materials needed for June, 1951, production. Farm equipment manufacturers now receive allotments of steel, copper and aluminum and priority ratings for other required materials under the Controlled Materials Plan.

WATERFOWL FEATHERS — Amendment of Aug. 17, 1951, of NPA Order M-56 makes it clear that waterfowl feathers and down still may not be obtained for maintenance, repair and operating supplies.

CHEMICALS—Amendment of Aug. 20, 1951, of NPA Order M-32 requires producers of phthalic anhydride and carbon tetrachloride to set aside certain amounts of them for filling of defense-rated orders.

CAST IRON WHEELS — Amendment of Aug. 20, 1951, of NPA Order M-64 stipulates that cast iron railway car wheels that are scrapped may be used only in producing new cast iron car wheels, unless NPA gives other authorization.

CONSTRUCTION — Amendment of Aug. 20, 1951, of NPA Order M-4A brings the order into conformity with the Controlled Materials Plan, under which the construction industry will operate beginning with the fourth quarter of this year.

ELECTRIC UTILITIES — Amendment of Aug. 21, 1951, of NPA Order M-50 provides for fourth-quarter allotments of controlled materials and advance authorizations of allotments for the first three quarters of 1952 for electric utilities.

Controlled Materials Plan

SMALL USERS—Amendment of Aug. 14, 1951, of Direction 3 to CMP Reg. 1 permits a manufacturer to order a full carload of carbon steel even though that amount may exceed the total permitted to be ordered in one month. Direction 3 had prohibited manufacturers from ordering for delivery in one month more than 35 per cent of their total quarterly allotments of any controlled material. Under the amendment, users of small quantities of carbon steel may thus purchase in carload quantities directly from steel mills and save on transportation. The amendment also permits a manufacturer to order up to 50 per cent of his advance quarterly allotment of steel, copper and aluminum for delivery in any one month for which the allotment is valid. In this case, a manufacturer is permitted to exceed 35 per cent of his quarterly allotment because advance allotments are only percentages of his current quarterly allotments.

UNRATED ORDERS—Direction 3 to CMP Reg. 3 gives unrated orders accepted by steel, copper and aluminum producers for fourth-quarter delivery equal preference status with authorized controlled materials orders until Sept. 10, 1951. After that date, authorized controlled materials orders will have preference over all others except those placed by NPA directives. Producers are directed to cancel unrated orders which have not been converted to authorized controlled materials orders by that date. Direction 3 was issued Aug. 21, 1951.

STEEL—Direction 3 to NPA Order M-1 provides that a steel producer can choose orders he wants, up to 15 days before expiration of lead times. In the remaining 15 days he must take in the order in which they are received all of the authorized controlled materials orders he can fill. Orders accepted before the 15th day prior to end of lead times must not exceed 90 per cent of the steel producer's monthly production.

STEEL—Direction 4 to NPA Order M-1 provides for transition to a full CMP in the fourth quarter of 1951. It reserves the former "free area" steel products for makers of consumer durable goods and passenger automobiles and holders of unrated orders which have been converted to authorized controlled materials orders. Direction 4 was issued Aug. 21, 1951.

BOUQUET FROM THE BOSS: When he visited Hotpoint Inc.'s Chicago plant to view progress on production of combustion chambers and compressor cases for Pratt & Whitney J-48 jet engines, Defense Mobilizer Wilson complimented officials for getting first pilot runs off lines 60 days ahead of schedule. Shown with Mr. Wilson in the new million-square-foot plant are James J. Nance, Hotpoint president (right) and Fred J. Walters, vice president-defense, Hotpoint

COPPER—Direction 2 to NPA Order M-11 permits copper producers to select the orders they want, up to 15 days before expiration of lead times. Such orders must not exceed 85 per cent of the production authorized for a month. Direction 2 was issued Aug. 21, 1951.

COPPER—Direction 3 to NPA Order M-11 reserves copper for users that are being brought under the CMP for the first time. Direction 3 was issued Aug. 21, 1951.

ALUMINUM—Direction 1 to NPA Order M-5 permits aluminum producers to accept orders until 15 days prior to expiration of lead times without regard to date orders are received. The tonnage so accepted must not exceed 85 per cent of the producers' monthly output. Direction 1 was issued Aug. 21, 1951.

ALUMINUM—Direction 2 to NPA Order M-5 reserves aluminum for users that are being brought under the CMP for the first time. Direction 2 was issued Aug. 21, 1951.

INVENTORIES — Amendment 3 to CMP Reg. 1 permits a manufacturer who has on hand controlled materials or Class A products which he cannot use for purposes permitted by this regulation to hold the materials for use in other authorized production schedules or ask government permission to sell them. Amendment 3 was issued Aug. 22, 1951.

ALLOTMENTS—Direction 6 to CMP Reg. 1 permits a manufacturer of a Class A product to ask his customer for an allotment of controlled materials to fill the order. If the customer fails to supply the allotment, the manufacturer can refuse the order. Direction 6 was issued Aug. 22, 1951.

CONSTRUCTION—Amendment of Direction 1 to CMP Reg. 6 makes minor changes in this regulation on construction. The amendment was issued Aug. 22, 1951.

NPA Delegation

CAA—Amendment of Aug. 21, 1951, of NPA Delegation 6 brings Civil Aeronautics Administration's procedures for ordering materials and equipment into line with the Controlled Materials Plan.

Price Regulations

MACHINERY—Interpretations 1 to 21 on Ceiling Price Regulation 30 (machinery) were issued Aug. 16, 1951, by the Office of Price Stabilization.

MACHINE TOOLS — Revision 1 of Supplementary Regulation 2 to Ceiling Price Regulation 30 allows manufacturers of machine tools to increase their base-period prices 12 per cent in determining their ceiling prices. Revision 1 was issued Aug. 21, 1951.

MACHINERY RESELLERS — Ceiling Price Regulation 67, issued Aug. 21, 1951, and effective Aug. 27, 1951, permits resellers of machinery and related goods to use their traditional percentage markups over cost.

Windows of Washington

By E. C. KREUTZBERG *Washington Editor*

Small business, a pet of Congress, has inadvertently been put in the dog house by Congress' own action in cutting down the budget of the Federal Trade Commission

A NOT INFREQUENT instance of congressional inconsistency is demonstrated in the Federal Trade Commission appropriation for fiscal 1952. By enacting Public Law 899, 81st Congress, the legislators amended the Clayton Act to ban acquisition of the assets—as well as the stock—of one corporation by another "where the effect might be to substantially lessen competition."

To carry out the purposes of the amendment, the commission asked for $500,000 for this fiscal year. Congress came up with $97,435—which is entirely inadequate to enable the commission to fulfill its new duty of applying the Clayton Act to relationships that were not previously held to be unlawful.

In the Dog House—The reduced appropriation is bad particularly for that pet of Congress, "small business." When a small businessman wants to sell out—usually because he is getting old and wants to retire—his best potential customer is his larger competitor. Such a plan was feasible—through the sale of assets—without colliding with the Clayton Act. Now, with a big question mark attaching to the transfer of assets, neither party knows if a merger can be made to stick. Recognizing that angle, the commission planned to set up a fast procedure for investigating proposed mergers and approving or disapproving them beforehand so parties could proceed on sure ground.

After Many a Summer—In particular, the commission planned to take into consideration, in its decisions, the will of Congress, that a retiring businessman, or his heirs, could liquidate a business without loss of assets by selling it as a going concern to a competitor. On the basis of the appropriation of $97,453, FTC's plans are now sadly disorganized. The commission still is compelled to investigate all the mergers, but can do so only as personnel become available for that purpose in the future—which means that approval or disapproval may be forthcoming years after the event.

FTC: Heavier Load, Lower Budget

Get Your Low Alloy Samples . . .

Have you tried boron-treated, low-alloy steels as substitutes for higher-alloy steels? If not you should be able to get samples for test purposes without too much difficulty. Army, Navy and Air Force metallurgists are urging contractors to make such tests and report results. Just about all alloy steel makers are producing the boron-treated, low-alloy steels in substantial quantities; NPA officials estimate that at least 25,000 tons are being produced during August and that even more will be produced in September.

NPA officials say results with the boron-treated, low-alloy steels have been very satisfactory to date in replacing higher-alloy steels in heavy-duty gearing, in heavy-duty shafting, and in heavily-stressed machine components such as arms and levers.

New Manufacturing Methods...

Alternate manufacturing methods are being studied by the armed services to determine which will yield the best product at the highest level of productivity and at lowest cost. They may stimulate techniques that so far have been lagging.

For example, what method should be adopted as standard for production of jet engine blades? (See also p. 72). Experimental contracts have been let for forging, casting, rolling, and pressing them from powdered metal. Also, is it more desirable to make tank tracks from steel castings than steel forgings?

Defense Pools to Date . . .

Two more defense contracting "pools" were approved by Defense Mobilizer Charles E. Wilson. That makes five altogether, to date. A number of others are still being formed.

The two new ones are the Peoria Consolidated Manufacturers Inc., Peoria, Ill. (it consists of 20 small manufacturers in and around Peoria) and the Central California War Industries Inc., Fresno, Calif. (it comprises 30 central California companies). The three pools previously approved (see STEEL, July 23, p. 44) have headquarters in San Jose, Calif., Brooklyn, N. Y., and Omaha, Neb.

GE 'Bares' All . . .

General Electric Co. continues a "bare-all" policy on many of its patents. It listed 259 in the Aug. 7 issue of the "Register of Patents Available for Licensing or Sale," which appears in each issue of the Patent Office's *Official Gazette*. GE also listed more than 30 patents of the former Carboloy Co. Inc. (now a GE division) in the Aug. 14 issue.

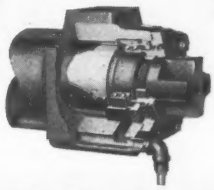
MORGAN WORCESTER

5-STAR SERVICE

for efficient production

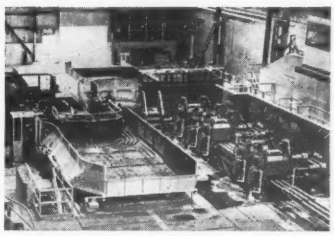
MORGAN CONSTRUCTION CO.
WORCESTER, MASSACHUSETTS

English Representative: International Construction Company
56 Kingsway, London, W.C. 2, England



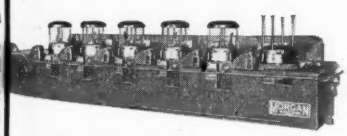
Morgoil Roll Neck Bearings

. . . will increase the accuracy of your product and save on operating and maintenance costs.



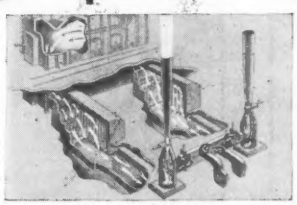
Continuous Rolling Mills

. . . built by specialists with over 60 years of pioneering in the field.



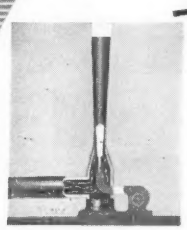
Wire Machines

. . . Morgan-Connors give high production, with low die cost, low power cost, low space requirement.



Furnace Control System

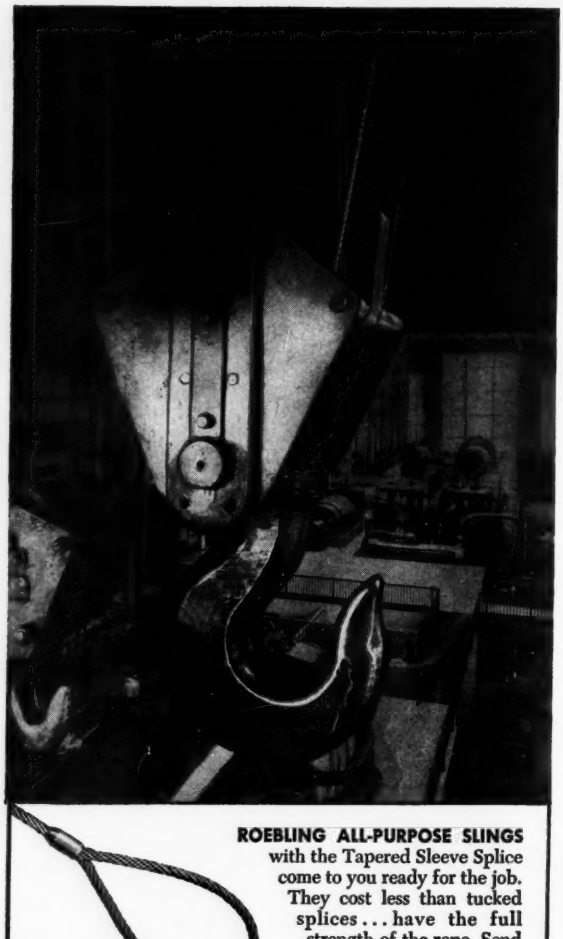
. . . Morgan-Isley increases efficiency of any regenerative furnace at relatively low installed cost.



Air Ejectors

. . . efficiently handle hot gases and fumes as high as 3000° F.

WIRE ROPE



ROEBLING ALL-PURPOSE SLINGS with the Tapered Sleeve Splice come to you ready for the job. They cost less than tucked splices . . . have the full strength of the rope. Send for the full story.

You'll get more efficient, economical service with ROEBLING rope

TIME AND DOLLAR SAVINGS are more important than ever in industrial operations. One sure way to save time and cut costs is to specify Roebling Preformed "Blue Center" Steel Wire Rope. Here's a tough rope that stands up under shocks, acceleration stresses, excessive abrasion and bending. Its preforming assures maximum handling ease, better spooling and smooth performance.

Roebling makes a complete line of wire rope. Have your Roebling Field Man recommend the *right* ropes for your requirements. And for longest life on the job, get his advice on the correct use and maintenance of wire rope. John A. Roebling's Sons Company, Trenton 2, New Jersey.

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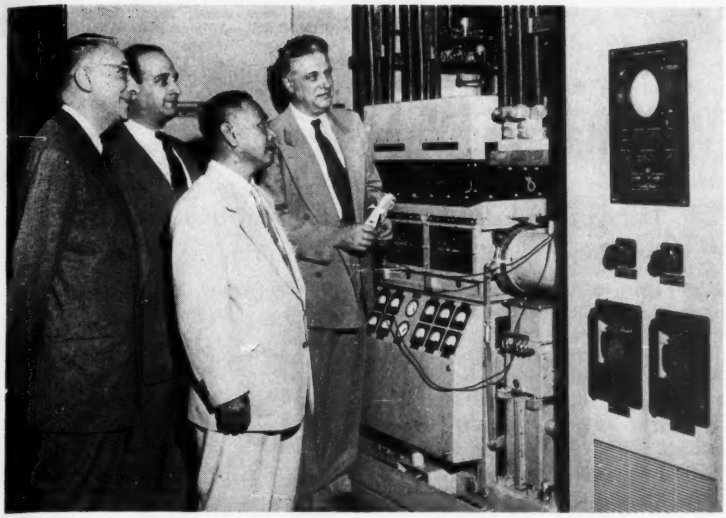


FIRST FOR THE PHILIPPINES: Scheduled for installation is a new $700,000 plant outside Manila, this big mechanical rectifier will help produce chlorine and caustic soda for Philippine industry. Here it is demonstrated at the plant of I-T-E Circuit Breaker Co., Philadelphia. Otto Jensen, right, explains the operation of the unit to: Left to right, H. G. Noordberg, I-T-E vice president; B. D. Van Eyck, industrial equipment manager of Philips Export Corp. of New York, who sold the equipment; and D. Tiosejo, vice president of Superior Gas & Equipment Co. of Manila, for whom it was manufactured

Warm the Chill on U.S. Investment Abroad

That's what American companies with foreign investing experience warn is essential before any Point Four or other government program can work well

MOST AMERICAN companies involved with overseas investments think that the obstacles to direct foreign investment must be removed before any Point Four or other proposals to aid underdeveloped areas can be effective.

Obstacles to direct foreign investment—exchange controls, labor problems, retarded economic development of the country—are encountered by nearly 80 per cent of the American companies with overseas investments that were surveyed by the National Industrial Conference Board. The report includes replies from American firms with 1097 branches and subsidiaries in foreign countries and holding "at least 54 per cent" of the direct foreign investment of all American companies.

The U.S. Doesn't Help—In addition to obstacles emanating from foreign countries, another complicating factor, many believe, are the taxes imposed by the U.S. on income originating abroad. Elimination or modification of "the present burdensome double taxation" on foreign investments by the U.S. as a means of fostering direct foreign investment is recommended by many of the executives surveyed. The conference board points out that foreign investments "do not appear to be limited" because of the absence of profit opportunities. About 11 per cent of the respondents said profit prospects were incommensurate with risks abroad.

Export or import quotas are the most frequently mentioned obstacles to direct investment by U.S. firms. In each of the broad geographic areas, export and import quotas are mentioned more frequently than any other problem.

A Matter of Money—The second most important obstacle to direct foreign investment named is the limitation that many countries have placed primarily upon the remittance of earnings, and also on the remittance of other income and expenses payable in dollars. The obstacle assumes greatest importance in industrialized countries.

Next in importance and closely connected with profit remittance limitations are the regulations concerning the movement of capital into or out of the country. The problem, again, is the most serious in industrialized areas.

The Social Security Burden — Fourth in importance are the burdens imposed upon business by social insurance. The problem is the weightiest in Latin America and Africa. Africa also is the most troubled of any area by the lack of trained native personnel.

Obstacles which revolve around the retarded economic development of the country are the next in importance. Facets of that group include: Lack of adequate roads, railroads, harbors; inadequacy of housing, recreational and shopping facilities for employees; and inadequate power facilities. Companies with foreign investment experience also complain about multiple exchange rates, restrictions on importation of personnel from the home country, lack of stable governments and the emergence of nationalization programs.

On Barren Ground — Companies queried by STEEL believe all or most of those roadblocks must be removed before a full-scale Point Four or government-spurred investment program can work well. Otherwise U.S. dollars would be as useless as seeds thrown on barren soil.

More Coal, Less Dollars to Ruhr

More and more American coal is going to West Germany, but fewer and fewer investment dollars.

Some 16 per cent of the July ingot steel production was made possible by U.S. bituminous shipments, and the ratio is rising. About 330,000 tons were shipped to the Ruhr in July; about 550,000 is due for September. Up until now, most of the U. S. - German coal movement comes about under private barter agreements. But early this fall, the German government will help with the financing of the imports, and the arrangements may come under some official status.

The Germans want American capital, but believe they have little chance of getting such investments. The codetermination arrangement in the republic's iron, steel and coal industries is one factor that scares American money away. Under codetermination, labor is given a voice in plant management.

ECA Deal Yields Aluminum

ECA has loaned $24 million toward a $50 million project to build an aluminum plant and expand the power works in western Norway.

HOW DOES your research organization chart shape up? Is there a good administrator in it—one who can handle test tubes and is still able to answer questions about what problems are to be researched, how much money is to be spent and how the problems are to be tackled?

Who Manages Your Research?

Technological development hangs on adequacy of administration as well as skill of technicians. With $2 billion annually at stake, research management is big job

THE SEARCH in research is on for the men who can handle administration as expertly as test tubes.

The total amount of money spent on research this year in the U. S. will exceed $2 billion, compared with only $260 million in 1939 (see chart). Any business that expands more than seven-fold in volume in 12 years is bound to have tough managerial problems.

Goal Ahead—To get the maximum benefits out of its increasing research dollars, industry must develop more research management personnel and define more clearly just what research management is. Industry's stake in the question is tremendous: Some 2600 American companies have research programs and in 1951 will spend nearly $700 million of the total $2 billion or more being poured into research. The government will account for about $1.3 billion, but industry has a stake there, too, because a good deal of the U. S. work is farmed out to private companies.

The problem of research management is one of several research headaches including the shortage of engineers and scientists and inadequate facilities. It is unusually difficult because insufficient attention has been given to it up to now, because research management entails skills not necessary in management of sales and production and because by their very nature many trained technical men aren't interested in administrative questions. What's more, necessity for more research management personnel arises from two causes: From the unusually rapid expansion of total research activities and from the growth of research activities into large scale operations. About 5 per cent of the 300,000 people currently employed in the research business are primarily in management jobs. The ratio probably should be higher. Some 100,000 of those 300,000 are engineers and scientists actually working on projects. The rest are employed on the clerical, maintenance and other corollary activities needed in research.

In a Nutshell—Dr. Clyde Williams, director of Battelle Memorial Institute, the research foundation in Columbus, O., says research management, basically, must determine: What problem or problems to undertake; how much to spend on the problem; and how to go about solving it. No matter whether you allow a few thousand or a few million dollars a year for your research budget, that is what your research management must decide, or you won't get a decent return for your money.

So, you recognize the need for another research management man in your organization. Where are you going to find him? What qualities should he possess? You are not going to find him among the graduates of a college business administration course, Dr. Williams believes. To his knowledge, no college has a curriculum tailored to the needs of a research management man. Your best bet will be to find what you want among your own research personnel —the man that gets along well with others, who is a natural leader, who has interests other than science or engineering alone. "Then be at your persuasive best to move him into administrative work," says the Battelle director. "Most of them don't want to leave their laboratories."

Bill of Particulars—The man with the business administrative training alone won't do, says Dr. Williams, because the prime requisite of a research management man is that he understand the engineer and scientist—their trials and tribulations, their hopes and aspirations. Hence he should have a background of experience in technology and research.

Other basic qualities are that the man must have a practical turn of mind, know how to get people to work for and with him and be able to deal with broad managerial and sales problems. Battelle Institute insists that practically all its management start out in research and have a broad experience before going into administrative functions. Once a technical background is mastered, then perhaps a business administration course superimposed on it would be helpful. At Battelle even the business and personnel managers are technical men. They're both engineers. Dr. Williams is also a chemical engineer.

A good research management man

Research: Seven-Fold Increase in 12 Years

RESEARCH	1939	1949	1950	1951
INDUSTRY	$200 MILLION	$500 MILLION	$600 MILLION	$700 MILLION
+	+	+	+	+
GOVERNMENT	$60 MILLION	$1000 MILLION	$1200 MILLION	$1300 MILLION
TOTAL	$260 MILLION	$1500 MILLION	$1800 MILLION	$2000 MILLION

All figures are estimated

DR. CLYDE WILLIAMS
Battelle Memorial Institute

must also have other qualities in greater degree than required in most personnel heading up other management functions. He must have the ability to direct, yet not direct too rigidly. Since research depends so heavily on the individual's ingenuity and inventiveness, management must not stifle the individual's particular bent. At Battelle there are no management-flow charts. In at least one case there are sections headed by different men that do remarkably similar types of work. That developed because two good men came along with talents in the same field and enough work developed for both to manage. Rather than sacrifice one, both were kept and allowed to set up their own divisions.

To Err Is Human—A management man, say research men, must also be given the freedom to err. In picking research projects, he's not going to select a winner every time. In a company as successful in research as E. I. du Pont de Nemours & Co., the firm invests about $4 in things that don't pan out, compared with each $1 riding on successful projects. Of 136 separate lab projects that were underway in one Du Pont research unit in the spring of 1948, just eight were commercially successful by the beginning of this year; 58 were terminated and work still continues on the other 70.

A research management man should also have a top executive title and voice in his company's affairs —vice president in charge of research, a member of the executive committee or board of directors or something similar. More and more of our large corporations are selecting technical men for top executive positions. Du Pont's President C. H. Greenewalt is himself a chemist and did research.

Side Benefits—Research management gives many benefits to your research program besides the added efficiency any direction affords. It permits the scientists and engineers in your employ to devote themselves 100 per cent to research without the distractions of purchasing, hiring or any of the other managerial functions they would have to take on catch-as-catch-can if management weren't well planned. Good research management can bring about a system of teamwork that's psychologically rewarding to technical men. It can bring greater concentration to bear on the problems of equipment and apparatus to give technical men better facilities.

New Profession—Research has grown so fast that scientists, engineers and management all are badly needed. The management problem is more difficult because management men have not been trained in ample numbers. It's a new kind of profession, grown up recently because research has become a large scale operation employing large numbers of men and expensive equipment.

One of the most important phases of research management lies in the selection of the research project. This requires experience, skill and study. Unless the project is selected wisely the end result of expensive research might be useless.

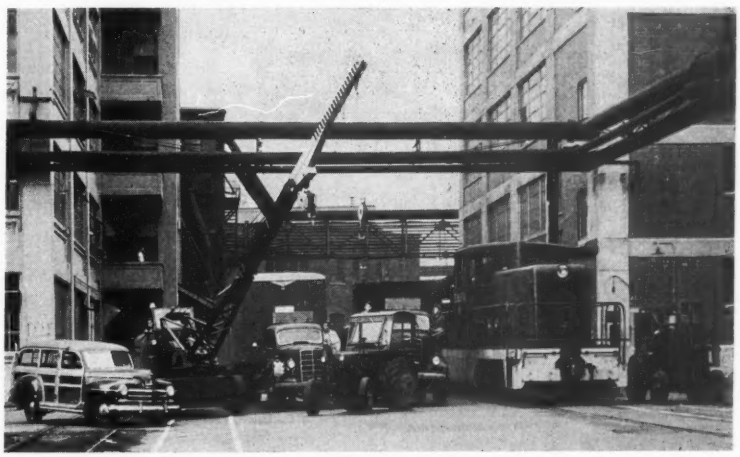
No accepted, well-known technique for the selection and definition of the research project has been developed generally. Battelle has worked out a plan for doing this. It studies the economic and technological background of an industry broadly, evaluates the future of sales of the product under consideration, assesses the technology and cost of product against those of competing products. Then, having determined the advisability of conducting a given research, Battelle carefully plans the program to meet the objectives of accomplishment and time.

Westinghouse Displays J-40

Westinghouse Electric Corp. placed its J-40 jet engine on limited display for the first time during the National Air Races in Detroit Aug. 18-19. The engine was seen in the lobby of the Statler Hotel under surveillance of a security guard.

Most details of the J-40, including power rating and structural arrangement, are still undisclosed, says W. B. Anderson, manager of Westinghouse Aviation Gas Turbine Division. For this reason, both arms of the air inlet ducts and the nozzle from which gasses emerge in the tail were blocked from view.

The engine was developed for the Navy, but no report has been made on combat planes it will power. Several Westinghouse plants are tooling to mass-produce J-40, while Ford's Lincoln-Mercury Division will also make a version under a license agreement.



DOUBLE DUTY: The extensive mobile two-way radio system installed at the 434-acre Eastman Kodak plant in Rochester, N.Y., is used as a combination industrial communications network and as a plant protection facility. Trucks, cranes, tractors, fork-lift trucks and locomotives—24 in all—are equipped with Motorola FM two-way radios. Useless movement time of the vehicles is saved about Kodak park because they can move from job to job without returning to a telephone or going to the dispatchers office to get further orders

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When Hyatt Roller Bearings are built into tables, cranes, cars, mill motors, and other equipment, you can be sure that the bearings are ideally suited for the job.

With a correctly designed Hyatt for each application, the equipment designers, working in close harmony with our experienced bearing engineers, make this assurance doubly sure.

Thus for easing shock loads, extending equipment life, and helping to reduce operating costs, Hyatts are the preferred Steel Mill bearings for new equipment or changeovers. Hyatt Bearings Division, General Motors Corporation, Harrison, New Jersey.

HYATT ROLLER BEARINGS

By H. C. TUTTLE *Detroit Editor*

Mirrors of Motordom

There's no monopoly on good ideas when it comes to testing cars. Chrysler and Ford go into testing in a big way. Phoenix, Ariz., seems destined to be a major test center

DETROIT

A WAG once quipped, "General Motors tests its cars at the proving ground, Chrysler on the public highway, Ford in the owners' hands." It wasn't strictly true but had wide circulation and stirred up many chuckles in this town where needling the competition is a favorite indoor and outdoor sport.

Possibly because anything repeated often enough eventually becomes credible, Ford and Chrysler are more willing to talk about their developments in testing. A recent example is Ford's rough road simulator (STEEL, July 30, p. 50).

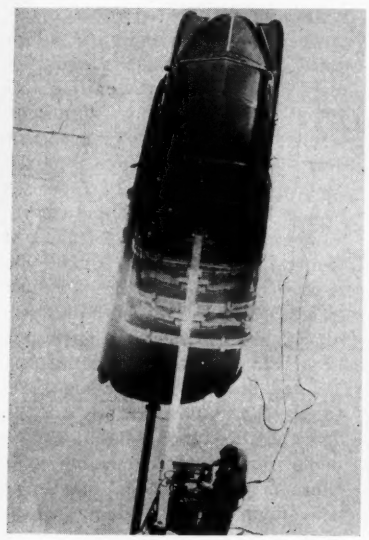
Sparked—Other evidences that GM has no monopoly on good ideas when it comes to car testing are also to be found. Need for better means of measuring the lightning-fast getaway of cars equipped with Chrysler's new 180-hp engine mothered the invention of a new electronic instrument.

The device (see cut) records with no chance for error to hundredths of an inch the distance traveled in each thirtieth of a second after the car starts. Such accuracy is made possible in a relatively simple way: From the instant the driver tramps down on the accelerator (thereby closing a switch to start the timer) measurement of elapsed distance and time are automatically recorded on a wax paper tape, attached to the car and to the stationary instrument.

Timing marks are made on the tape by a regularly repeated electric spark.

Some of the many instruments used by Ford in its road-testing program are shown in the cut at the right. All 17 get a workout in the course of a 40,000-mile test cycle on Ford-built cars operating out of the Phoenix, Ariz., laboratory. Most distinctive of the devices shown is No. 6, the so-called fifth wheel. Looking like a beefed-up bicycle wheel, the device has come to be a trademark of test cars when attached to the rear end. It is used to measure distance and speed with extreme accuracy. Three types of speedometers (7) are used in conjunction with the fifth wheel to indicate speeds independently of the conventional speedometer which is subject to variables in the rear wheels. Some of the other instruments pictured are the fuel burette (1) which gives an accurate reading on fuel consumption at all speeds; the pyrometer potentiometer (3) which shows temperatures from 0 to 2000 degrees at any point in the car connected to it by thermocouples (4); the barrage (8), an arrangement of seven stop watches which is used to determine rate of acceleration in ten-mile increments from 10 to 70 miles per hour; a tachograph (9), combining a clock and speedometer to record movement of the vehicle; and tachometers (10) which indicate engine rpm's.

Stirred—Hot-weather capital for vehicle testing is Phoenix, Ariz., where extremes of road and temperature conditions can be found in a few minutes' driving time. General Motors began an organized test program in that region 13 years ago when it established a laboratory in Phoenix and in June



CHRYSLER'S GETAWAY

FORD'S PERFORMANCE

. . . instruments help bury an old gag about automobile testing

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broadened this activity by purchasing 2280 acres of land 34 miles to the southeast of town. Ford has been operating out of Phoenix since 1946.

The dust stirred up around Phoenix is effectively utilized by Ford for checking seals around doors, windows and deck-lids to see how much if any of the talcum-like substance can penetrate. Oil bath air cleaners also get a good chance to prove their merits.

Because the altitudes range from 246 feet below sea level to 9000 feet above, and winter temperatures sometimes go as low as 25 below zero, the location provides other extremes. Ford has three types of runs for its car tests there: Customer highway driving, durability run, and the hill route.

K-F Story: Cargo Planes, Cars

With only a modest amount of fanfare, Kaiser-Frazer is fast approaching production of complete C-119 cargo planes. First production of subassemblies for the mammoth plane got under way June 26, and some of these parts, plus a few from new subcontractors, are being fitted in with those coming in from Fairchild Aircraft. Now there are fuselage and wing sections for several planes in various stages of completion.

At no other place in the automotive industry is it possible to get such a clear picture of what is meant by the phrase "guns and butter." Willow Run is perhaps better suited than any other plant for side-by-side production of aircraft and passenger cars. More than one million of the plant's 3.5 million square feet is assigned to the defense work. Ingenious rearrangement of the remainder permits production in excess of the current schedule of about 230 cars a day. The first C-119 will likely be completed early this fall.

Buttered Side—K-F's President Edgar F. Kaiser shocked automotive writers at a press conference during the National Air Races when he said K-F plans to increase fourth quarter production. (K-F's present output quota, fixed by NPA is 1.55 per cent of the industry's total for the third quarter.) Mr. Kaiser said K-F has NPA's blessing to go to 3 per cent when the company wishes. He believes there will be a shortage of new cars this year and blames a fear complex in Washington for the dullness in auto sales.

Something else for automen to chew over was Mr. Kaiser's disclosure that the company is experimenting with all-aluminum engines, made by three processes: Permanent mold, die casting and brazing. Though going through test paces in cars now, the engines are not on the nearby production scene. As yet, among K-F people, there is no unanimity as to which method of production is the most advantageous.

Auto, Truck Output

U. S. and Canada

	1951	1950
January	645,688	609,878
February	658,918	505,593
March	802,737	610,680
April	680,281	585,705
May	695,898	732,161
June	653,673	897,853
Six Mos.	4,137,195	3,941,878
July	527,502*	746,801
August		842,335
September		760,847
October		796,010
November		833,784
December		671,622

Week Ended	1951	1950
July 28	131,462	191,978
Aug. 4	117,010	175,572
Aug. 11	97,351	182,965
Aug. 18	129,541	190,879
Aug. 25	133,000	179,042

Sources: Automobile Manufacturers Association, Ward's Automotive Reports. *Preliminary.

Huddles About Autos Under CMP

Purchasing men and their bosses have been in tight huddles since NPA's announcement that automobile steel, aluminum and copper would be distributed under CMP come the final quarter. Just how bad the outlook is for the whole industry no one can say with any real certainty. Manly Fleischmann, NPA administrator, guaranteed consumer durable goods makers will not be squeezed out, despite their coming into the already overloaded CMP program late. Unrated orders on mill schedules, he says, will not be displaced until Sept. 15, giving manufacturers sufficient time to get their CMP allotments. Further, he advises that the setaside provisions on mill schedules will be retained until that date for the year's final three months. Few in the industry now think that CMP can cover them in October, and the going is to be extremely rough, but not enough so as to force the industry into a ditch.

To some car makers, copper and aluminum are seen as the roadblocks, to more its steel. None but the most deep-dyed pessimists, however, believe major shutdowns are in store. CMP will not be popular.

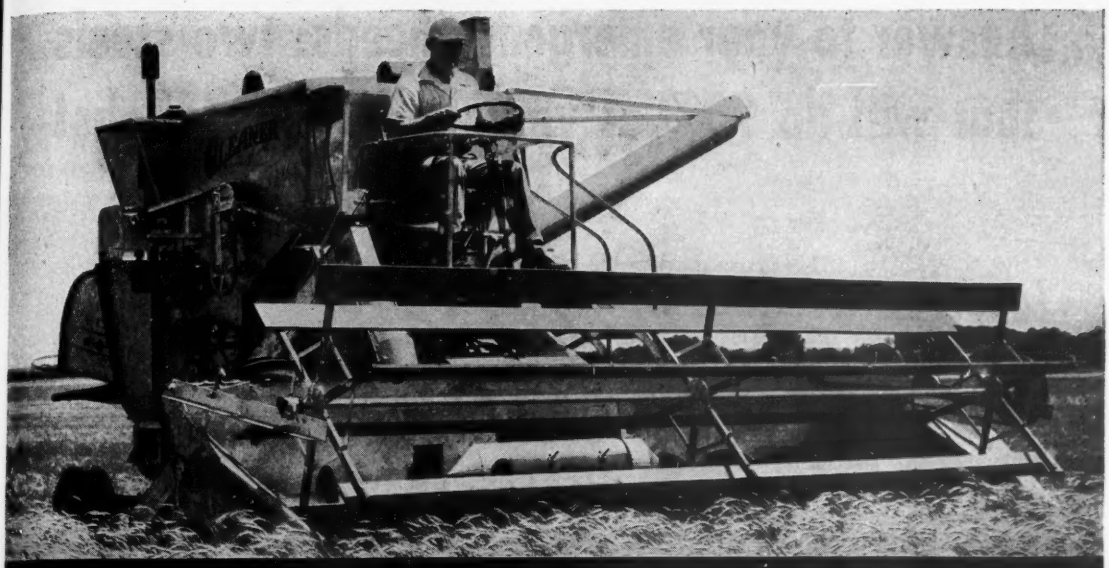
The automakers still assert they can do better without it, but with the die cast they now say they'll help make it work. In this neck of the woods there is no talk of scuttling CMP by word or deed.

'Million-Miler' Engines on Trucks

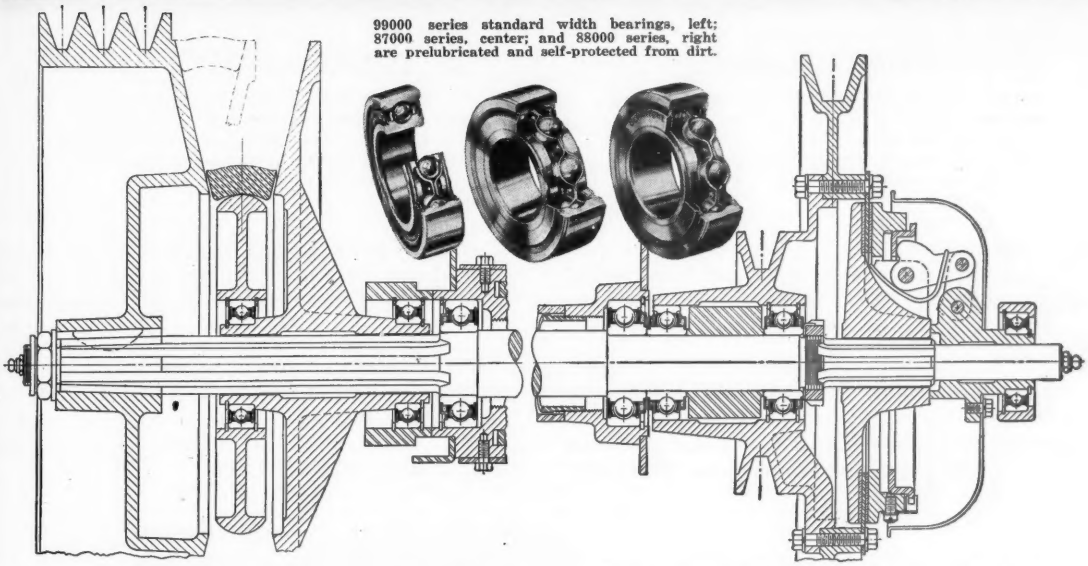
Have you been caught behind a truck on a long hill? Have you had a truck overtake you when he was making his run to get momentum to carry him over the next one? If your answers are yes, you'll like the latest news out of GMC Truck & Coach Division of General Motors. Two new diesel engines developed by GMC, says General Manager Roger M. Kyes, make those dangerous annoyances a thing of the past.

Horsepower of the new engines is up substantially from the ones they replace. In the four-cylinder model, formerly rated at 133 horsepower, the new engine develops 150. The six-cylinder diesel, formerly a 200-horsepower job, develops 225, and in both significant savings in fuel are realized. A device known as the Fuel Modulator which automatically feeds the proper amount of fuel and air for maximum efficiency regardless of throttle position is credited with most of the fuel saving. The new diesels, called "Million-Miler" engines, are definitely a new approach to motive power equipment.

Two especially ingenious features of the new engines are: 1. They are designed so that components are interchangeable with those in previous GMC diesels. A conversion kit changes an old engine into a "Million-Miler." The cylinder head and block have ground faces and fit together without a gasket.



Bearings Have Their "Freedoms", Too!



99000 series standard width bearings, left; 87000 series, center; and 88000 series, right are prelubricated and self-protected from dirt.

● In the Gleaner Harvester Corporation's new 14 foot self-propelled combine, New Departure self-sealed and pre-lubricated ball bearings on the main clutch shaft feature several important "Freedoms". Prominent among these are freedom from **relubrication** — freedom from **adjustments** — freedom from servicing **time** — all of which add up to more freedom for the farmer — or more time for productive work, with equipment that stays cleaner, works better.

These sealed ball bearings are versatile, taking thrust or radial loads or both, in each self-contained unit. In the variable speed pulley and idler, on the main shaft, in the clutch release and clutch pulley positions, they simplify design — reduce drilling and tapping operations — give the builder freedom from the use of many small parts such as separate seals and closure caps — all adding up to a stronger, longer lasting machine for the farmer.

New Departure, Division of General Motors, Bristol, Connecticut

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NEW DEPARTURE BALL BEARINGS

Answer to your emergency needs: two steels that will do 90% of your hollow parts jobs!

1. 52100 TUBING

101 stock sizes. A high carbon chrome, direct quenching steel which gives through hardness in moderate sections. Typical uses: aircraft parts, slitter knives, bearing races, pump parts and plungers, collets, bushings, spindles, grinding machines, precision instruments.

2. "NICKEL-MOLY" TUBING

52 stock sizes. A low carbon nickel moly, carburizing steel which gives high surface hardness with a tough core. Typical uses: piston pins, bearing races, farm equipment, knitting machinery, sleeves, bushings, pump parts, perforating guns.

NEED steel for a rush job? Two general purpose Timken® steels—52100 tubing and "Nickel-moly" tubing—will do 9 out of 10 of your hollow parts jobs. And you can get immediate delivery on warehouse lots.

We maintain a mill stock of 101 sizes of 52100 tubing (from 1″ to 10½″ O.D.) and 52 sizes of "Nickel-moly" tubing (from 1⅜″ to 10¼″ O.D.). Both steels have excellent hardenability and extreme wear resistance.

You can be sure of getting the properties you want in every tube of every heat. We melt the steel, roll the billets and pierce the tubes, all in our own mill under the most rigid quality control.

For a stock list giving heat treating instructions as well as available sizes and finishes, write on your company letterhead to The Timken Roller Bearing Company, Steel and Tube Division, Canton 6, Ohio. Cable address: "TIMROSCO".

YEARS AHEAD—THROUGH EXPERIENCE AND RESEARCH

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Specialists in alloy steel—including hot rolled and cold finished alloy steel bars—a complete range of stainless, graphitic and standard tool analyses—and alloy and stainless seamless steel tubing.

The Business Trend

Downtrend in industrial production index is reversed as automobile workers return to work from vacations and labor disputes

A BACK TO WORK movement in the automobile industry not only brought about an increase in auto output but raised the industrial production index to the highest level since the end of June.

Reflecting this upturn, STEEL's industrial production index in the week ended Aug. 18 registered 214 per cent of the 1936-1939 average. Recording of 214 was a reversal of direction, for since the end of July the index had been slipping off, the week ended Aug. 11 being marked by 205.

While a level of 214 is below the 218-mark of the comparable week of last year, it is every bit as great an accomplishment, for industrial production now is under government restrictions.

Auto Sales Crowd Output . . .

The return to work in the auto industry followed plant-wide vacations and interruptions from labor disputes. Back in full force on the job, the automobile workers turned out 129,541 passenger cars and trucks in the United States and Canada in the week ended Aug. 18, says *Ward's Automotive Reports*. In the preceding week the outturn was the lowest thus far this year—97,352.

Auto makers indicate they would be producing even more cars than they now are if they had enough materials. Despite reports of a slowdown in auto sales, the sales are reported to be as great as production.

Steel Production Rides High . . .

While auto production remains in the "slow lane" to give right-of-way for the country's defense build-up, other segments of the country's industry are driving full speed ahead to attain goals marked out for them. In many cases now, materiel for the armed services is rolling out in big volume.

To help support this flow, the steel industry continues to produce beyond its rated capacity. In the week ended Aug. 25, for instance, output of steel for ingots and castings was expected to be 2,007,000 net tons, the American Iron & Steel Institute reports. The industry's weekly capacity is 1,999,034 tons. In the week ended Aug. 18, yield was 2,029,000 net tons.

Electric Power Sets Record . . .

To keep the wheels of industry whirring for the defense effort and for the expanding economy, the electric power industry is producing at near-record rates. A new all-time record was set in the week ended Aug. 18. It was 7,164,469,000 kilowatt-hours. Weekly output of electricity has been running from 12 to 13 per cent above that of comparable weeks of last year.

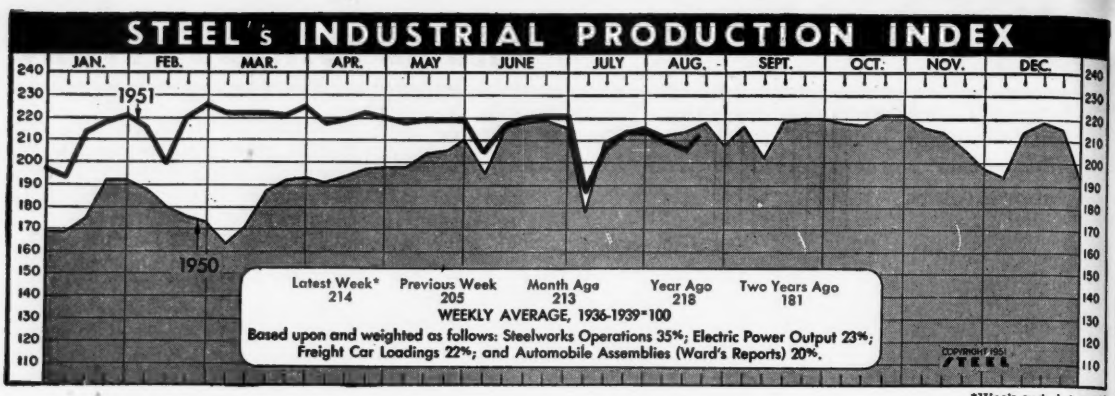
Shorter Workweeks . . .

In the transition from purely peacetime operations to part-peace, part-defense production the average workweek of production workers in manufacturing plants slipped off a little. The decline between mid-June and mid-July lowered the workweek to 40.4 hours, about the level of a year earlier, the U. S. Bureau of Labor Statistics reports.

Durable goods industries were primarily responsible for the reduction,

BAROMETERS of BUSINESS

		LATEST PERIOD*	PRIOR WEEK	MONTH AGO	YEAR AGO
INDUSTRY	Steel Ingot Output (per cent of capacity)†	102.0	102.0	101.5	102.0
	Electric Power Distributed (million kilowatt hours)	7,164	7,070	6,975	6,370
	Bituminous Coal Production (daily av.—1000 tons)	1,697	1,667	1,407	1,817
	Petroleum Production (daily av.—1000 bbl)	6,250	6,231	6,166	5,708
	Construction Volume (ENR—Unit $1,000,000)	$215.0	$216.9	$361.1	$250.1
	Automobile and Truck Output (Ward's number units)	129,541	97,352	131,419	190,879
	*Dates on request.† Weekly capacities, net tons: 1951, 1,999,035; 1st half 1950, 1,906,268; 2nd half 1950, 1,928,721.				
TRADE	Freight Car Loadings (unit—1000 cars)	815†	809	805	851
	Business Failures (Dun & Bradstreet, number)	158	149	133	186
	Currency in Circulation (in millions of dollars)‡	$27,925	$27,904	$27,781	$26,976
	Department Store Sales (changes from like wk. a yr. ago)‡	−8%	−14%	−10%	+25%
	†Preliminary. ‡Federal Reserve Board.				
FINANCE	Bank Clearings (Dun & Bradstreet—millions)	$14,723	$14,656	$15,519	$15,328
	Federal Gross Debt (billions)	$255.9	$255.6	$255.0	$257.6
	Bond Volume, NYSE (millions)	$12.3	$11.9	$13.7	$19.7
	Stocks Sales, NYSE (thousands of shares)	7,215	7,580	6,394	8,323
	Loans and Investments (billions)†	$70.0	$70.1	$70.1	$67.9
	United States Gov't. Obligations Held (millions)†	$30,920	$30,997	$30,697	$35,154
	†Member banks, Federal Reserve System.				
PRICES	STEEL's Weighted Finished Steel Price Index††	171.92	171.92	171.92	156.99
	STEEL's Nonferrous Metal Price Index‡	224.6	224.6	226.0	200.2
	All Commodities†	177.4	177.8	178.7	165.8
	Metals and Metal Products†	188.1	188.1	188.2	174.4
	†Bureau of Labor Statistics Index, 1926=100. ‡1936-1939=100. ††1935-1939=100.				


STEEL's INDUSTRIAL PRODUCTION INDEX
JAN. FEB. MAR. APR. MAY JUNE JULY AUG. SEPT. OCT. NOV. DEC.
1951
1950
Latest Week* 214
Previous Week 205
Month Ago 213
Year Ago 218
Two Years Ago 181
WEEKLY AVERAGE, 1936-1939=100
Based upon and weighted as follows: Steelworks Operations 35%; Electric Power Output 23%; Freight Car Loadings 22%; and Automobile Assemblies (Ward's Reports) 20%.
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*Week ended Aug. 18

which resulted largely from widespread vacation shutdowns.

Over the year, decreases in the average workweek have been reported in many consumer durable goods industries. Since early spring, both hours and employment have been declining in these industries both because of restrictions on nondefense uses of metals and a falling off in consumer demand. These reductions in employment and hours, however, have been generally less pronounced than the cutbacks in civilian goods output because of the rapid expansion in the volume of defense orders.

Average weekly earnings of production workers in manufacturing declined 76 cents over the month, but, at $64.56 in July, were $5.35 above a year earlier.

More Plants for Industry . . .

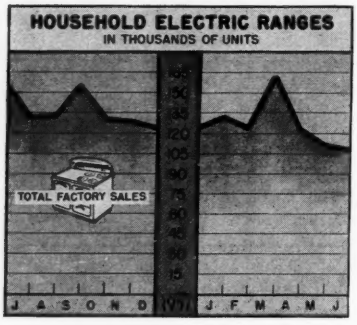
The defense program and the nation's expanding economy have caused the country to outgrow its plants. So, industry has been taking this problem in its stride too. Week after week this year, the industrial building classification has been the leader among construction contract awards. Again, in the week ended Aug. 16, industrial building was on top. Of the $215 million worth of contracts reported by *Engineering News-Record* for that week, $69.5 million was in industrial buildings.

Slowdown for Housing . . .

On the other hand, housing starts are expected to decline sharply after August because of a drop in public projects and continuing tight controls. In July, 83,000 new private nonfarm dwelling units were started, a decline of 5 per cent from June and the lowest July total since 1946.

Coal's Pace Is Steady . . .

Production of bituminous coal kept a steady pace, and in the week ended

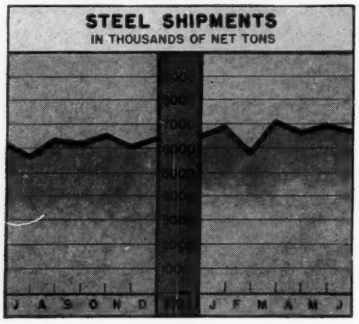


Household Electric Ranges

Total Factory Sales—Units

	1951	1950	1949
Jan.	132,437	97,925	109,919
Feb.	123,953	118,989	88,333
Mar.	162,267	145,417	88,934
Apr.	122,803	132,859	60,739
May	109,572	145,498	52,881
June	107,861	158,534	69,107
July	.....	130,505	63,249
Aug.	.....	132,243	66,753
Sept.	.....	156,216	93,045
Oct.	.....	130,452	73,312
Nov.	.....	129,384	60,523
Dec.	.....	124,360	77,011
Total ...	.....	1,602,382	903,806

National Electrical Mfrs. Assoc.

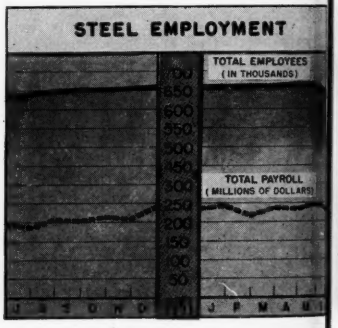


Steel Shipments

Net Tons

	1951	1950	1949
Jan. ..	6,904,688	5,482,691	5,788,632
Feb. ..	5,776,229	5,134,780	5,519,938
Mar. ..	7,105,078	5,723,340	6,305,681
Apr. ..	6,634,510	5,780,453	5,596,786
May ..	6,938,708	6,252,672	5,234,862
June ..	6,645,897	6,192,438	5,177,259
July ..	.....	5,668,898	4,534,855
Aug. ..	.....	6,326,464	4,918,314
Sept. ..	.....	6,145,354	5,236,196
Oct. ..	.....	6,503,531	935,037
Nov. ..	.....	6,051,145	3,296,809
Dec. ..	.....	6,432,776	5,410,902

American Iron & Steel Institute



Steel Employment, Payrolls

	Employees† in Thousands		Payrolls in Millions	
	1951	1950	1951	1950
Jan.	657	609	$245.3	$189.3
Feb.	663	613	219.4	174.7
Mar.	663	616	238.3	190.0
Apr.	666	621	234.8	186.2
May	667	628	249.0	199.9
June	642	636	230.2	195.3
July	643	....	188.7	
Aug.	649	....	206.6	
Sept.	650	....	203.8	
Oct.	650	....	212.2	
Nov.	653	....	208.0	
Dec.	657	....	235.0	

† Monthly average. American Iron & Steel Institute.

Charts—Copyright 1951, STEEL

Aug. 11 totaled 10,180,000 net tons. In the two preceding weeks output was slightly above 10 million tons.

This year's production through Aug. 11 totaled 316,617,000 tons, compared with 289,551,000 tons in the comparable period of last year.

Consumption of coal by beehive and oven coke makers in the first half of 1951 totaled 56,522,000 tons, a record for a six-months period, the Interior Department reports. Coke ovens are now the largest consumers of bituminous coal, accounting for about 28 per cent of the total current consumption, the department pointed out. The department predicts that the expanded production of steel will lead to a continued high demand for coking coal and estimates that consumption of coal by coke ovens will total more than 113 million tons for this calendar year.

Low Point for Ranges . . .

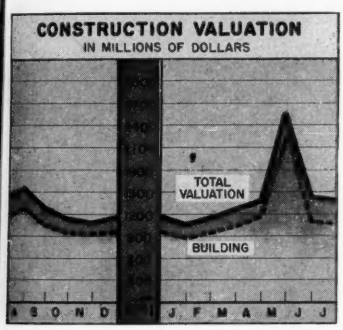
Factory shipments of domestic gas ranges were lower in July than in any of the preceding months of this year. They totaled 106,500. During the rest of the year, however, sales of gas appliances are expected by the Gas Appliance Manufacturers Association to be increased considerably by the recent relaxation of consumer credit controls, coupled with normal seasonal sales pickup during the fall.

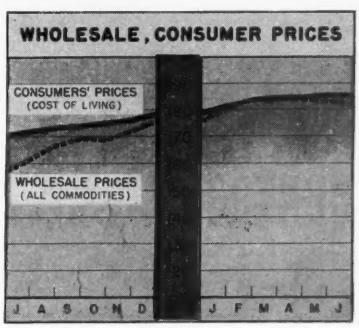
Trends Fore and Aft . . .

The government's wholesale price index declined 0.2 per cent in the week ended Aug. 14 . . . Class 1 railroads had 1602 new locomotives on order Aug. 1, compared with 1674 on July 1 . . . Shipments by American Cladmetals Co., Carnegie, Pa., in the first half of 1951 were 35 per cent greater than its entire 1950 shipments . . . Cash dividend payments by United States corporations issuing public reports totaled $1116 million in June, up 25 per cent over June of 1950 . . . Television receiver shipments to dealers in June totaled 160,308, compared with 234,522 in May. . . . In 24 out of 26 manufacturing and nonmanufacturing industries, output per man-hour rose between 1949 and 1950.

Issue Dates of other FACTS and FIGURES Published by STEEL:

Durable Goods Aug.6	Gray Iron Castings..Aug.13	Ranges, Gas July30
Employ., Metalwk. .July16	Indus. Production...July23	Refrigerators Aug.6
Fab. Struc. Steel...July30	Ironers Aug.20	Steel Castings Aug.13
Foundry Equip. July16	Machine Tools Aug.6	Steel Forgings Aug.20
Freight Cars Aug.20	Malleable Castings..Aug.13	Vacuum Cleaners ..Aug.6
Furnaces, Indus. ..Aug.13	Pumps, New Orders.July9	Wages, Metalwkg. ..Aug.13
Furnaces, W. Air...July30	Purchasing Power ..July23	Washers Aug.20
Gear Sales Aug.6	Radio, TV Aug.20	Water Heaters June25





Construction Valuation

(37 States)—In Millions of Dollars

	Total		Building	
	1951	1950	1951	1950
Jan.	1,043.2	730.9	881.9	578.8
Feb.	1,140.5	779.5	962.3	627.0
Mar.	1,267.4	1,300.2	1,043.8	1,075.3
Apr.	1,375.0	1,350.5	1,108.9	1,123.5
May	2,573.0	1,347.6	2,295.0	1,083.0
June	1,408.9	1,345.5	1,098.4	1,072.0
July	1,379.8	1,420.0	1,084.7	1,162.2
Aug.	.....	1,548.9	.....	1,295.1
Sept.	.....	1,286.5	.....	1,048.3
Oct.	.....	1,135.8	.....	956.7
Nov.	.....	1,087.1	.....	931.6
Dec.	.....	1,169.4	.....	969.0
Total	.....	14,501.1	.....	11,922.5

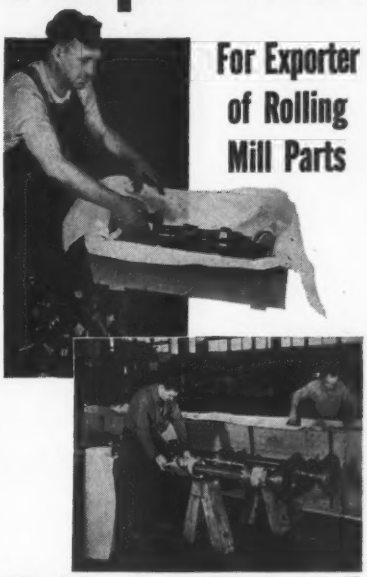
F. W. Dodge Corp.

Price Indexes

	Wholesale (1926=100)		Consumers (1935-39=100)	
	1951	1950	1951	1950
Jan. ..	180.1	151.5	181.5	168.2
Feb. ..	183.6	152.7	183.8	167.9
Mar. ..	184.0	152.7	184.5	168.4
Apr. ..	183.6	152.9	184.6	168.5
May ..	182.9	155 9	185.4	169.3
June ..	181.7	157.3	185.2	170.2
July ..	....	162.9	....	172.0
Aug. .	....	166.4	....	173.4
Sept. .	....	169.5	....	174.6
Oct. ..	....	169.1	....	175.6
Nov. .	....	171.7	....	176.4
Dec. ..	....	175.3	....	178.8

U. S. Bureau of Labor Statistics.

How Vapor Stops Rust



For Exporter of Rolling Mill Parts

Slushing Costs Eliminated! Packaging Time Slashed!

WITH

Angier VPI* Wrap

This amazing box liner does it!

Inside these overseas-bound crates the chemical coating on Angier VPI Wrap slowly releases an invisible vapor. It permeates the area around these rolling mill parts . . . prevents rust almost like magic! So effective is this proven vapor rust preventive that rejects due to rust are eliminated. Slushing in grease or oil is not necessary — this means "cleaning" costs for customers are eliminated! Substantial savings in packaging time for VPI-users is an obvious fact!

For facts that tell how *you* can ship and store metal articles or parts RUST-FREE at less cost . . . write today to:

*Reg. U. S. Pat. Off. Vapor rust preventive

Angier CORPORATION
Framingham 8, Mass.
Industrial Packaging Engineers since 1895
Representatives and Distributors in Principal Cities

Angier Corp., Framingham 8, Mass.

Yes Send case studies of your revolutionary vapor rust preventive TO:

INTEGRATED PROCESS CONTROL assures quality of

Ohio Rolls

SHAPING METAL FOR ALL INDUSTRY

Select from any of these eleven types of Ohio Steel and Iron Rolls:
Carbon Steel Rolls
Ohioloy Rolls
Ohioloy "K" Rolls
Holl-O-Cast Rolls
Chilled Iron Rolls
Denso Iron Rolls
Nickel Grain Rolls
Special Iron Rolls
Nioloy Rolls
Flintuff Rolls
Alloy Chilled Iron Rolls

At Ohio Steel a team of specialists, working as a closely-knit unit, supervises production of your rolls. This coordinated talent (metallurgists, chemists, engineers, inspectors) brings you better rolls faster. We refer to these experts and their knowledge of foundry practice as INTEGRATED PROCESS CONTROL.

THE OHIO STEEL FOUNDRY CO. LIMA, OHIO

PLANTS AT LIMA AND SPRINGFIELD, OHIO

Men of Industry

Leo P. Manske was elected president of **Syncro Machine Co.**, Perth Amboy, N. J., and **George L. Morris** was elected general vice president. Mr. Manske formerly was secretary-treasurer, and Mr. Morris was vice president in charge of sales.

General Controls Co., Glendale, Calif., appointed **S. D. Andrews** branch manager of its Dallas office. He replaces **Robert Farmer** who was appointed factory engineer of the Glendale plant.

Northrop Aircraft Inc., Hawthorne, Calif., appointed **R. R. Nolan** general manager of its Anaheim, Calif., plant for production of tank optical range finders.

John S. Kerr was appointed Cleveland district sales manager, **Eaton Mfg. Co.**, Reliance Division. He succeeds the late **H. P. McCormick** to whom he was assistant since 1945.

Linwood L. Adams was appointed manager, transportation planning, and **T. Lester Fossick Jr.**, manager, traffic planning of **United States Steel Co.**, Pittsburgh.

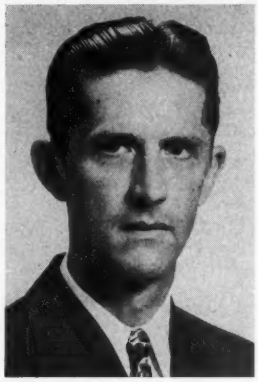
Dorsey H. Rowe was appointed advertising manager of **Cleveland Worm & Gear Co.**, Cleveland, and its affiliate, **Farval Corp.** He formerly was associate editor, *New Equipment Digest*, Penton Publishing Co.

H. Stanley Bimpson was named to the office of the director of engineering, general machinery division, **Allis-Chalmers Mfg. Co.**, Milwaukee.

Russell T. Jones and **Donald L. Rearick** of Youngstown Works, **Republic Steel Corp.**, were promoted to the respective positions of assistant superintendent, Bessemer rolling and finishing mills, and assistant superintendent of the electrical department.

Charles S. James Co., San Jose, Calif., flange manufacturer and steel fabricator, appointed **Sheldon Griffin** as sales manager with headquarters at its San Francisco offices.

Arthur E. Gogol, formerly with Reading Railroad Co., was named traffic manager of **Firth Sterling Steel & Carbide Corp.'s** McKeesport, Pa., plant. **E. William Kalb** was named assistant manager of the steel sales division.



PAUL F. SCHRECK
. . . Moto-Truc V. P.-sales

JOHN G. STAPLER
. . . heads Nat'l. Gypsum's Niles plant

Moto-Truc Co., Cleveland, elected **Paul F. Schreck** vice president in charge of sales, and elected **R. C. Heiser** sales manager. **S. W. Williams** was placed in charge of purchasing.

Federated Metals Division, American Smelting & Refining Co., established a midwestern department and appointed **Carl J. Gross** as its general manager. Federated has two producing plants in this territory at Whiting, Ind., and Detroit. Both will be under the direction of Mr. Gross who will continue as manager of the Whiting plant. **Allan Nichamin**, formerly Detroit sales manager, was appointed manager of the Detroit plant to succeed **Robert Ruch**, resigned. **Waldo C. Larson** continues as superintendent at Detroit. **John W. Kelin** was appointed midwestern sales manager, with headquarters at Whiting. **George M. Baumann** was appointed assistant general manager and purchasing agent of the midwestern department.

George A. Johnson, sales manager of the Rochester, N. Y., products division of **General Motors Corp.**, was named administrative assistant. He is succeeded by **Frederick W. Cummings**, who was assistant sales manager.

Landis Tool Co., Waynesboro, Pa., appointed **J. S. Mourer** as manager of its Pittsburgh office. He previously worked in the Chicago area for Landis. The Pittsburgh office, newly formed, is at 4140 Brownsville Rd.

Harvey J. Anschuetz was appointed sales engineer for **Creative Industries**, Detroit. He formerly was body development engineer and later chief product engineer for Kaiser-Frazer.

John G. Stapler was appointed manager of **National Gypsum Co.'s** metal lath plant at Niles, O., to succeed **John Manofsky**, retired. For the last three years Mr. Stapler was chief of industrial engineering for Stewart-Warner Co.'s South Wind Division. **William J. Sprau** was appointed production engineer for National Gypsum's four plants. He formerly was plant engineer at Kalamazoo, Mich.

J. P. Orchard, executive vice president, Ft. Wayne Division, **Bowser Inc.**, Ft. Wayne, Ind., was elected president to succeed **E. C. Marsh**, who is resigning Aug. 31 after 42 years' service with the company.

Howard A. Davis was appointed eastern regional manager of **Rigidized Metals Corp.**, Buffalo. He has headquarters in Philadelphia. For the last three years he was associated with the Detroit office.

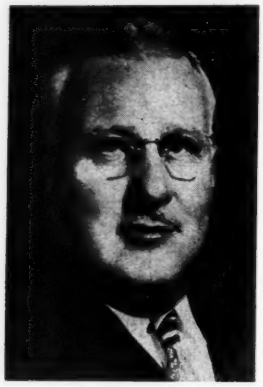
Dr. Harry G. Mitchell, formerly director of product development and advertising for **Speer Carbon Co.**, was recalled to his World War II post as chief, carbon products section, National Production Authority, Washington. While Dr. Speer is on indefinite leave from Speer Carbon Co. and subsidiaries, International Graphite & Electrode Corp., Speer Resistor Corp., and Jeffers Electronics, his advertising duties will be filled by **Ives Harvey** of the parent organization.

A. F. Zamis was appointed chief engineer of **Illinois Tool Works**, Chicago.

C. R. Irvine was appointed assistant division manager and chief engineer

of **Convair Guided Missile Division, Pomona, Calif., Consolidated Vultee Aircraft Corp.**

H. G. Bratt was appointed general manager of manufacturing, metal division, **Continental Can Co. Inc.,**



H. G. BRATT
. . . gen. mgr., Continental's metal div.

New York. He formerly was manager of manufacturing for Continental's Pacific division, and prior to that was general manager of its Cuban division. Mr. Bratt replaces **L. C. Walgash,** resigned.

F. A. Hopp, formerly associated with the Delta Power Division of Rockwell Mfg. Co., was appointed advertising manager of **Cleaver - Brooks Co.,** Milwaukee, which manufactures equipment for the generation and utilization of heat.

Park Chemical Co., Detroit, announces the following appointments as sales representatives for its heat treating division: **A. T. Ridinger** and **Lawrence Ridinger,** partners in Industrial Electro-Gas Equipment Co., Minneapolis; **M. K. Griggs** and **B. W. Wallen** of M. K. Griggs Co., Houston; and **Hugo W. Hiemke,** California Alloy Products Co., S. Pasadena, Calif.

Sales application engineers added by **Reliance Electric & Engineering Co.,** Cleveland, are: **Ralph D. Abercrombie Jr.,** Buffalo; **Rex T. Willard,** Atlanta; **Merle K. Sieber,** New York; and **Nicholas D. McKay,** Detroit.

Arthur R. Hines was appointed assistant manager of marketing for **General Electric Co.,** located in the New York office. He was manager of the Michigan sales district of the company's apparatus lines since that district's formation in 1949. **Edwin H. Howell** was named assistant manager of the east central district, apparatus marketing division, with headquarters in Cleveland, the position effective Sept. 1. **Arthur T. Bourgault** was appointed manufacturing analyst for the chemical materials department, Pittsfield, Mass., and **Paul Stahlberg** is sales development supervisor of GE rubber - phenolic molding compounds. Also effective Sept. 1 **Edmund C. Schorr** was appointed sales manager, specialty transformer and ballast department, Ft. Wayne, Ind. **Vice Adm.** (U.S.N. ret.) **William A. Kitts III** is now associated with General Electric and is manager of Ordnance engineering for aircraft, federal and marine divisions.

Norman R. Miller was appointed project engineer, and **Littleton Strong** research engineer of Bowser Technical Refrigeration Division, **Bowser Inc.,** Terryville, Conn.

Link-Belt Speeder Corp., Chicago,

KENNETH T. RUDD
. . . treasurer, Link-Belt Speeder

shovel - crane manufacturer, elected **Kenneth T. Rudd** as treasurer, with headquarters in Cedar Rapids, Iowa. **Harry E. Kellogg,** who is vice president and treasurer of Link-Belt Co. in Chicago, previously served as treasurer of Link-Belt Speeder Corp.

Walter E. Palmer was appointed regional manager for **All-State Welding Alloys Co. Inc.** to cover New Jersey, eastern Pennsylvania, Maryland, Delaware and District of Columbia. He previously was eastern manager for Hollup Corp., field sales manager for Alloy Rods Co. and special representative for McKay Co.

Dr. Raymond C. Machler was appointed director of research and a member of the executive committee of **Leeds & Northrup Co.,** Philadelphia. Formerly associate director of research, Dr. Machler succeeds **I. Melville Stein,** who recently was elected to the newly created post of executive vice president.

Austin L. Hawk was appointed assistant manager of the western sales district of Manhattan Rubber Division, **Raybestos-Manhattan Inc.** He will be located in Chicago. **S. V. V. Hoffman** was appointed regional manager of Raybestos - Manhattan's West Coast sales division with headquarters at Los Angeles.

J. E. Piccardo, president of Shasta Pump Co., Oakland, Calif., has become operating vice president of **Barnes-Shasta Co.** following a merger of Shasta and the Barnes Mfg Co. of Mansfield, O. Its Oakland plant will be taken over by the Barnes manufacturing unit. Under the new setup, **William Stillwell,** formerly coast manager for Barnes, takes over as sales manager.

Clifton M. Kolb retired from the **Glidden Co.,** Cleveland. He was senior vice president and secretary. **John A. Peters,** treasurer, was also elected a vice president. **Robert D. Horner** is now secretary.

Robert S. Bubb joined **American Brake Shoe Co.,** New York, as marketing engineer.

R. W. Steingerwalt was appointed metallurgical adviser, railroad materials and commercial forgings, **United States Steel Co.,** Pittsburgh. He has been metallurgical engineer in that department.

Cecil Harvey, formerly assistant to

CECIL HARVEY
. . . joins Elliott Co.

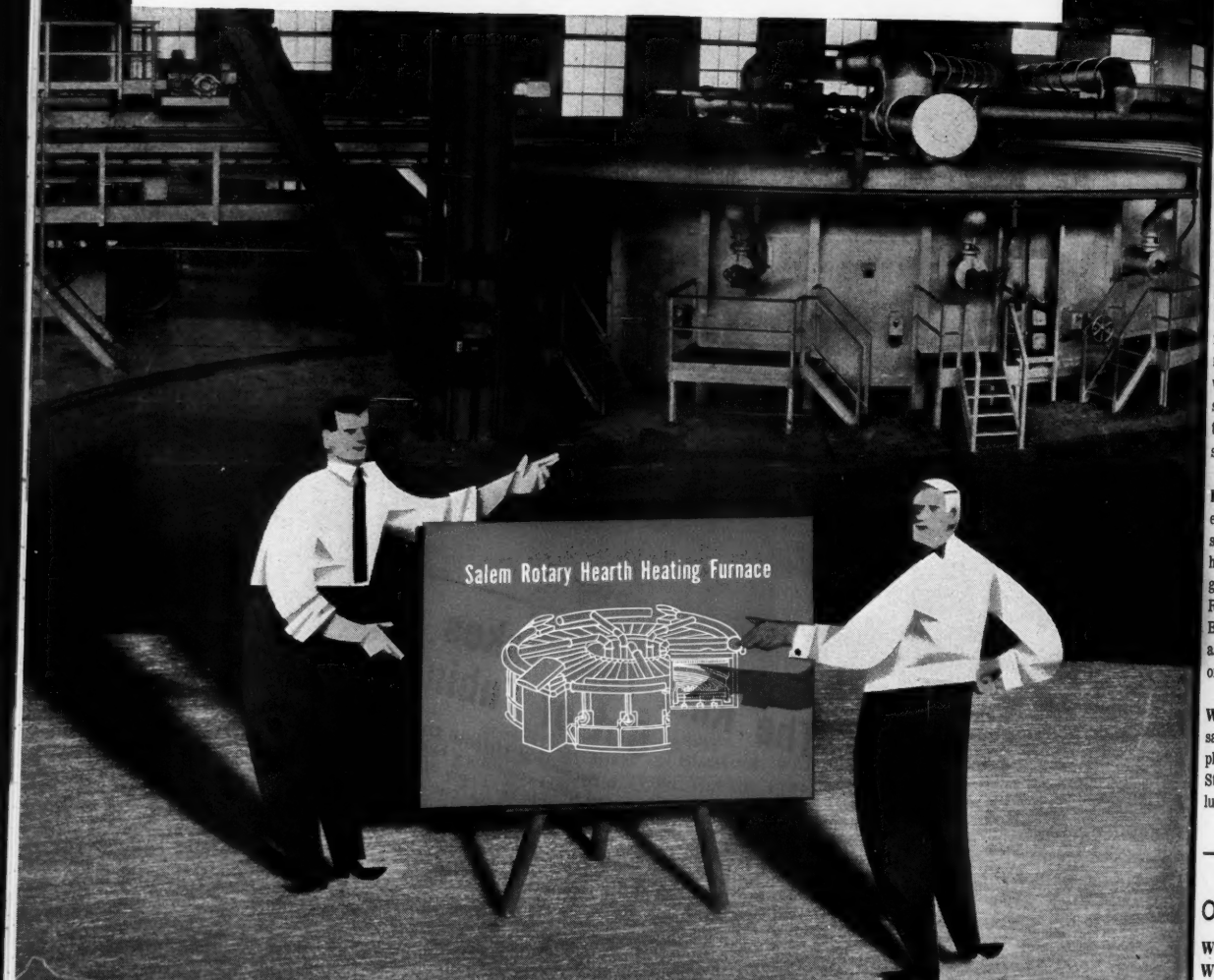
sales manager of Gibson Electric Co., joined the headquarters sales staff of the large motor division of **Elliott Co.** at Ridgway, Pa., where he will head application engineering work on large synchronous motors and all vertical motors. He will also serve as Elliott's

ROUND AND SHAPED TUBING
.010" to ⅝" O.D. Max.
Certain Analyses .035" max. wall to 1⅜" O.D.
Available in:
Carbon Steels:
A.I.S.I.—C-1008, MT-1010, MT-1015, C-1118, MT-1020, C-1025, C-1035, E-1095
Alloy Steels:
A.I.S.I.—4130, 4132, 4140, 4150, 8630, E-52100
Stainless Steels:
A.I.S.I.—303, 304, 305, 309, 310, 316, 317, 321, 347, 403, 410, 420, 430, 446, T-5
Nickel Alloys:
Nickel, "D Nickel"®, "L Nickel"®, "Monel"®, "K Monel"®, "Inconel"®, 30% Cupro Nickel, 18% Nickel Silver.
Beryllium Copper.
®Reg. U. S. Trademark International Nickel Company
THE HOLE STORY
by Superior
Chapter 3
The Kink That Takes the Kinks Out of Tubing
In the machine above, a length of tubing is shooting through a row of teeth. It will emerge straight as an arrow—ready for any tough job tubing can do.
Why all this fuss? Because whether our customers use Superior tubing as tubing or thread it, flare it, bend it, flatten it, they want to start with a straight piece to avoid misalignment or poor machining at any stage of operation.
In short, when a customer gets small tubing from us he expects tubing that is mechanically perfect as well as dimensionally precise and metallurgically sound. And he gets it.
We have many ways of insuring adherence to superior standards in all three. Frequent sampling for chemical analysis and microscopic examination checks metallurgy. Close visual and instrumental inspection at every stage of handling insure dimensional precision and mechanical perfection.
Because of Defense Orders, shortages of metals and other conditions beyond our control, we may not be able to supply all of your requirements for fine, small tubing but it will pay you to specify Superior. Your distributor may be able to fill your order out of stock.
Superior Tube Company, 2005 Germantown Ave., Norristown, Pennsylvania.
West Coast: Pacific Tube Company, 5710 Smithway St., Los Angeles 22, Calif. UNderhill 0-1331.
Superior
THE BIG NAME IN SMALL TUBING
All analyses .010" to ⅝" O.D.
Certain analyses (.035" max. wall)
Up to 1⅜" O.D.

flexible*

accurate*

*Two good words to aptly describe the operation of a *Salem Rotary Hearth Heating Furnace* at work in your plant. Whether your hot-metal operations include piercing, forging, or rolling ferrous or non-ferrous metals, your automatically controlled Salem Rotary will flexibly and accurately adapt itself to large variations in heating and tonnage rates —thus maintaining economy despite downtime for changeover in your metal forming operations. Moreover, you'll reduce scale loss, simplify handling, and save money on labor and maintenance. For greater yield at lower cost, you should be using a Salem Rotary. Write to us.



SALEM ENGINEERING DIVISION,

Salem-Brosius, Inc. Salem, Ohio

Affiliates: Brosius Division, Pittsburgh 15, Pa.
Salem Engineering Co., Ltd., Milford nr. Derby, England; Salem Engineering (Canada) Ltd., Toronto, Canada

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August 27,

P. C. HALDEMAN JR.
. . . gen. supt., Blaw-Knox div.

GEORGE W. SCHROEDER
. . . purchasing agent for Vapor Heating

electric motor consultant to the pulp and paper industry.

P. C. **Haldeman Jr.** was promoted to general superintendent of Pittsburgh Rolls Division, **Blaw-Knox Co.**, Pittsburgh, and **F. H. Frey** was made manager of roll sales. Mr. Haldeman, who joined the firm in 1943, was previously assistant general superintendent, and Mr. Frey, with the company 15 years, was division service engineer.

Kyle L. Menuez was appointed general manager, rubber products division, **Ball Bros. Co.**, Muncie, Ind. He has resigned a vice presidency and general managership of Gro-Cord Rubber Co. to become associated with Ball Sept. 1, but continues to serve as a member of the Gro-Cord board of directors.

William F. Eberly was appointed sales representative in the Philadelphia district by Vanadium-Alloys Steel Co. after serving in the metallurgical laboratories at Latrobe, Pa.

George W. Schroeder was appointed purchasing agent for **Vapor Heating Corp.** and **Roth Mfg. Co.**, a subsidiary, Chicago. Mr. Schroeder has been with Vapor and Roth 16 years and has been assistant purchasing agent for several years. He previously worked in the production, testing and planning departments.

Ralph N. DuBois was appointed chief product engineer of **Ford Motor Co.'s** aircraft engine division, Chicago. He has been in aircraft engine development work since 1922.

Clearing Machine Corp., Chicago, appointed **A. Leo West** and **David D. Wallace** as assistant treasurers.

Joseph Kroll was appointed manager of the experimental division of **Kaiser-Frazer Corp.**, Willow Run, Mich. He was associated with various Kaiser interests on the West Coast before going to Willow Run.

Peter V. Martin, sales manager, metallurgical department, engineering-construction division, Koppers Co. Inc., Pittsburgh, was made an assistant vice president in the **Freyn Engineering Department** of the division, which has headquarters in Chicago. Mr. Martin remains in Pittsburgh.

Cleveland Cliffs Iron Co., Cleveland, announced promotions as follows: **E. L. Kirkwood,** public relations administrator; **J. D. Condon,** assistant to office manager; **R. H. Sheppard,** assistant purchasing agent; and **C. C. Knight,** assistant purchasing agent.

Maurice D. Low was appointed to the position of director of purchasing, and **Dean E. Hethington** to the post of purchasing agent of **Crouse-Hinds Co.**, Syracuse, N. Y. **John B. Link** and **Paul B. Billy** were named assistant purchasing agents.

John B. Hazle was promoted to general works manager of **Interlake Iron Corp.**, Cleveland. He moves to the Cleveland headquarters after 23 years of service at the Toledo, O., plant, where he has been general superintendent since 1949. He is succeeded at Toledo by **Lindsay Johnson,** assistant superintendent at the plant. **B. H. Carmichael,** assistant general superintendent at the Erie, Pa., plant, was transferred to Toledo to become assistant general superintendent and blast furnace superintendent.

William A. Spence was appointed general manager of **Ohio Hoist & Mfg. Co.**, Cleveland, one of the Round Associate Chain Cos. Since 1934, with the exception of three years in the Army, Mr. Spence has been with Manning, Maxwell & Moore Inc.

Harold Tiley was appointed general sales manager of **Caloric Stove Corp.**, Philadelphia. He has been field sales manager for the last two years.

OBITUARIES...

William H. Nichols, 78, president of **W. H. Nichols Co.**, Waltham, Mass., died Aug. 9. Mr. Nichols invented the Zenith Rayon pump, the Gerotor pump and the Nichols hand miller.

William A. Coryea, 58, former project manager for **Rust Engineering Co.,** died at his home in Pittsburgh after a long illness. With Rust since 1928, he was an authority on paper mill and on power plant design and construction for the steel industry.

William C. Zimmerman, 74, cofounder and former president of **Aluminum Match Plate Corp.,** Buffalo, died Aug. 11. He helped found the firm in 1933 and was president until he retired four years ago.

Isaac Litner, 71, founder and president of **Bridgeport Pressed Steel Corp.,** Bridgeport, Conn., died Aug. 16.

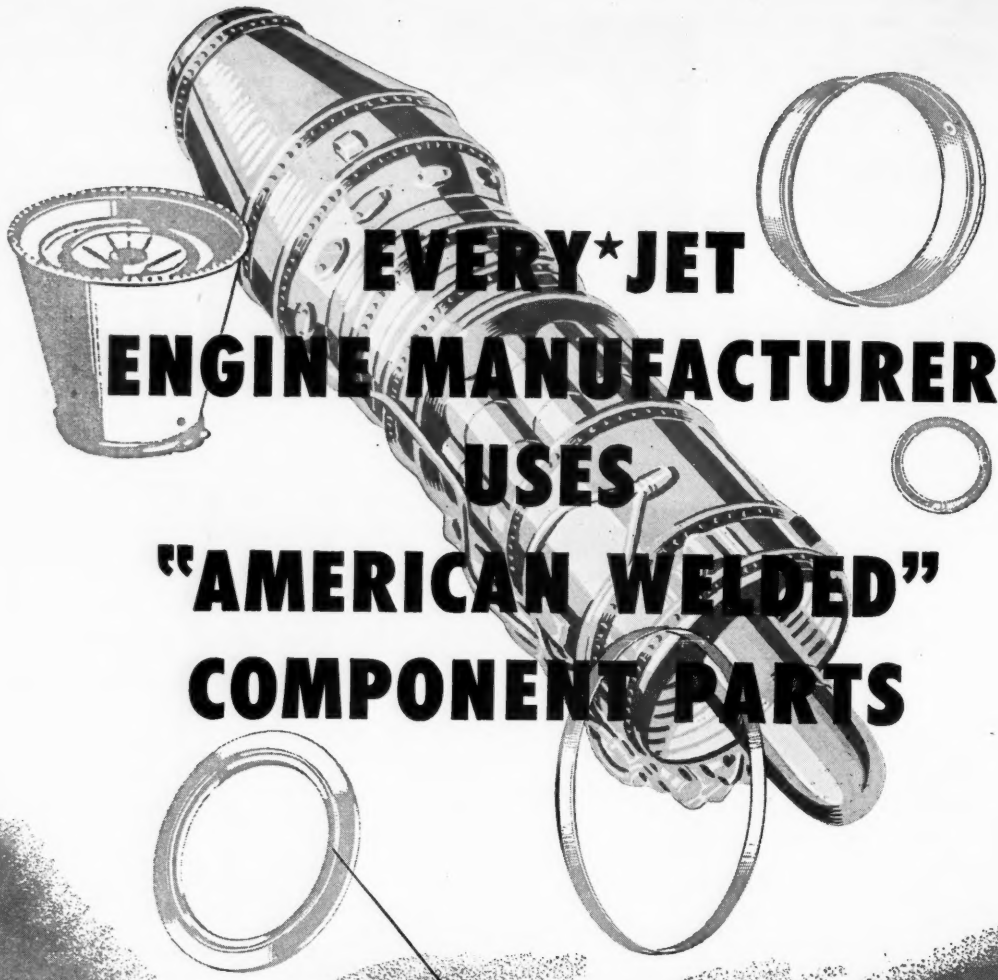
Chester A. Fulton, 67, retired mining engineer and former president of **American Institute of Mining & Metallurgical Engineers,** died Aug. 16 in Baltimore.

Ledyard Heckscher, 79, former president of **Alan Wood Steel Co.,** died Aug. 17 at his summer home, Atlantic City, N. J.

Henry F. Binder, 55, sales manager for the Chicago branch of **Baldwin-Lima-Hamilton Corp.,** died Aug. 15 of a heart attack.

C. S. J. Trench, 71, editor and publisher of *American Metal Market* since 1929, died at his home on Staten Island, N. Y., Aug. 20.

Wilbur D. Hockensmith, 73, president of Hockensmith Corp., Penn, Pa., for many years, died Aug. 20. At the time of his death he was chairman of the board.



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Production AND Engineering
NEWS AT A GLANCE

ACID CONSUMPTION CUT—Savings of 25 per cent in sulphuric acid consumption and a 24 per cent increase in tonnage of steel cleaned are reported by one user of a new liquid acid accelerator in pickling tanks. Prior to the use of the accelerator at this installation about 600 gallons of acid was used daily. This figure dropped to 450 gallons with the additive and the net annual saving in acid is estimated to be about 2 million pounds a year. Worldwide shortage of sulphur and sulphuric acid makes the development particularly timely.

BETTER BLADE PERFORMANCE—Research on gas turbine blade materials is keeping pace with turbojet and turboprop engines. Studies are being pushed in three directions—toward developing substitutes for scarce alloying elements, toward improving mechanical details for better performance at high operating temperatures, toward design changes which will conserve fuel. Principal attention is concentrated on blades and disks which use "super alloys" in quantity. Substitutes for cast and forged alloys composed of high percentages of chromium, nickel, cobalt and molybdenum are under closest scrutiny. —p. 72

MORE POWER FROM MOTORS—By-product of research to develop faster submarines may be a better electric motor for automobile starters and for powering industrial machinery. This is the deduction from a recent Naval Research Laboratory report on the physical phenomena underlying "flashover"—an electrical flame which spreads over the commutator of a dc motor when it is overloaded. If flashover can be eliminated the way may be open to more horsepower per cubic inch of motor and, by inference, faster submarines.

ONE AIRPLANE: $880,000—A note on military equipment costs: The P-61 Northrup Black Widow fighter plane, used extensively in the last war, was priced at a little over $220,000. Its modern counterpart, the F-89 Scorpion, is being sold to the Air Force for $880,000. Beyond the effects of inflation, the newer job has many features as yet undeveloped when the Black Widow was in production. They include the "zero reader" navigating aid, electronic automatic pilot, instrument landing system, electronic fuel metering system, afterburner control, fuel valve control system, electronic yaw stabilizer, marker beacon radio, interservice cockpit lighting system, 120-volt generating system, and electronic windshield defog and de-ice controls.

FATIGUE TUNING FORK—New fatigue testing machine, operated and controlled by simple electrical circuits, operates as a "tuning fork" which subjects the test specimen to vibratory bending stresses. It is automatically excited electronically in resonance with the natural frequency of the assembly, usually 40 to 100 cycles per second. Difficulty of controlling the amplitude of the resonant vibration within narrow limits was solved by employing a new and relatively simple circuit actuated from a micrometer screw which is used to preset the amplitude desired. Development work was carried out at the University of Illinois.

AIR-ELECTRIC GAGING—American machine tool builders are showing interest in a differential pressure pneumatic-electric system of gaging and co-ordinated machine control recently introduced in this country by a French firm. Installations of the so-called Etamic system have been made on plain cylindrical grinders and one is being engineered for Ford to provide size control on grinding of piston pins. The method is also used as a flying gage control of strip rolling and wire drawing operations. —p. 80

FLUE DUST CONTROLLED—When concentration of blast furnace flue dust exceeds a predetermined limit, a gas analyzer unit sounds the alarm, controlling the gas cleaning equipment. Installed in an Eastern steel plant, the device gives a continuous record of dust in the gas and advises when dust content is getting too high. —p. 90

MORE ACCURATE SHAPES—Aircraft parts are being stretch-formed more and more as the trend toward more complex structural designs continues. Using conventional presses, one airplane builder has evolved several different forming systems: One employs two straight line material gripping jaws; another, segmented jaws which can be arranged in either a straight or contoured configuration. —p. 77

STEAM HEATED PAINT—Recent development in spray painting is a steam spraying method which mixes very dry electrically superheated steam with the paint in a spray gun. It is claimed finishing materials of higher viscosity can be applied in thicker films with one pass of the gun, resulting in coatings that are free from blemishes, sags, popping or runs, and equivalent in quality to conventional finishes, with fewer coats. Other advantages: Increases in productivity of existing equipment, reduction in volume of material, solvents and thinners normally required, less overspray and reduced drying operations. —*A.H.A.*

Research Pushed on Gas Turbin

Metallurgists from industry, universities and NACA study cast and forged alloys, sintered metal powders and ceramals to find replacements for critical metals and to perfect blades having longer life at high operating temperatures, thereby improving efficiency of turbo-type air engines

METALLURGICAL research in the field of turbojet and turboprop aircraft engines, already programmed for production on a tremendous scale—perhaps as many as 18,000 per month—is being pushed in three directions—toward developing substitutes for critically short alloying elements, including columbium, tungsten, cobalt, nickel, chromium and molybdenum; toward perfection of mechanical details which will produce better performance in present operating temperature ranges, and finally toward developing compressor-turbine designs which will operate at higher temperatures and thus become more efficient from the standpoint of fuel consumption. Concentrated gas turbine engine development and research work is under way today at the Lewis Flight Propulsion Laboratory of the National Advisory Committee for Aeronautics in Cleveland which makes its findings available regularly to private engine contractors also busy in this type of work.

A typical engine requires 2000-4000 pounds of the above mentioned critical metals—400-800 pounds of nickel, gross, alone. There is naturally a high degree of scrap loss in these metals because of the extensive amount of machining necessary to assure the soundness and precision finish of various components. Efforts also are being made to reduce this figure.

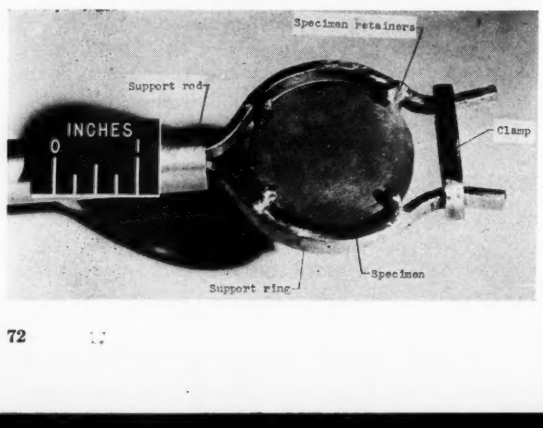
Blades and Disks Critical — Principal attention focuses on turbine blades and disks since it is here that a principal weight of "super alloys" is concentrated. Compressor blades may be made of aluminum, although compressor disks usually are of ferrous alloy. Turbine nozzle vanes of stainless steel such as type 347 or 321 perform satisfactorily. An accompanying chart lists 25 high-temperature alloys which have been proposed for turbine blades and disks at one time or another and which have been tested for stress-rupture properties. Tests were made at four temperatures—1200, 1350, 1500, and 1800° F for periods of both 100 hours and 1000 hours, and the effort made to evaluate them in a "merit order" according to their performance characteristics.

Striking feature of all the alloys listed is the high percentages of chromium, nickel, cobalt and molybdenum required in their makeup. Only about nine could be considered iron-base alloys, although it is this type of alloy which technicians would like to perfect. It will be observed that the highest ranking alloys at the four testing temperatures, starting with the lowest temperature and going up, are Refractalloy 26, S 816, Inconel X (columbium modified), X-50 and X-40, the latter being cobalt-nickel-chrome types and practically beyond consideration in time of war because of their high cobalt content—around 50 per cent.

Basically, what is wanted in the gas turbine blade or bucket include the following: Good stress-rupture properties at 1500° F; good fatigue strengths, thermal shock resistance and naturally high corrosion resistance to hot gases. There has been a trend from materials such as cast vitallium to the forged alloys, in the interest of improving fatigue properties. However, when it comes to volume manufacture, the shortage of adequate forging capacity makes other types of blades desirable. Two possibilities are pre-

Thermal shock evaluation setup used in investigation of carbide-type ceramal of 80 per cent titanium carbide plus 20 per cent cobalt as blade material

Holder and specimen for thermal shock testing. Specimen floats in retainers



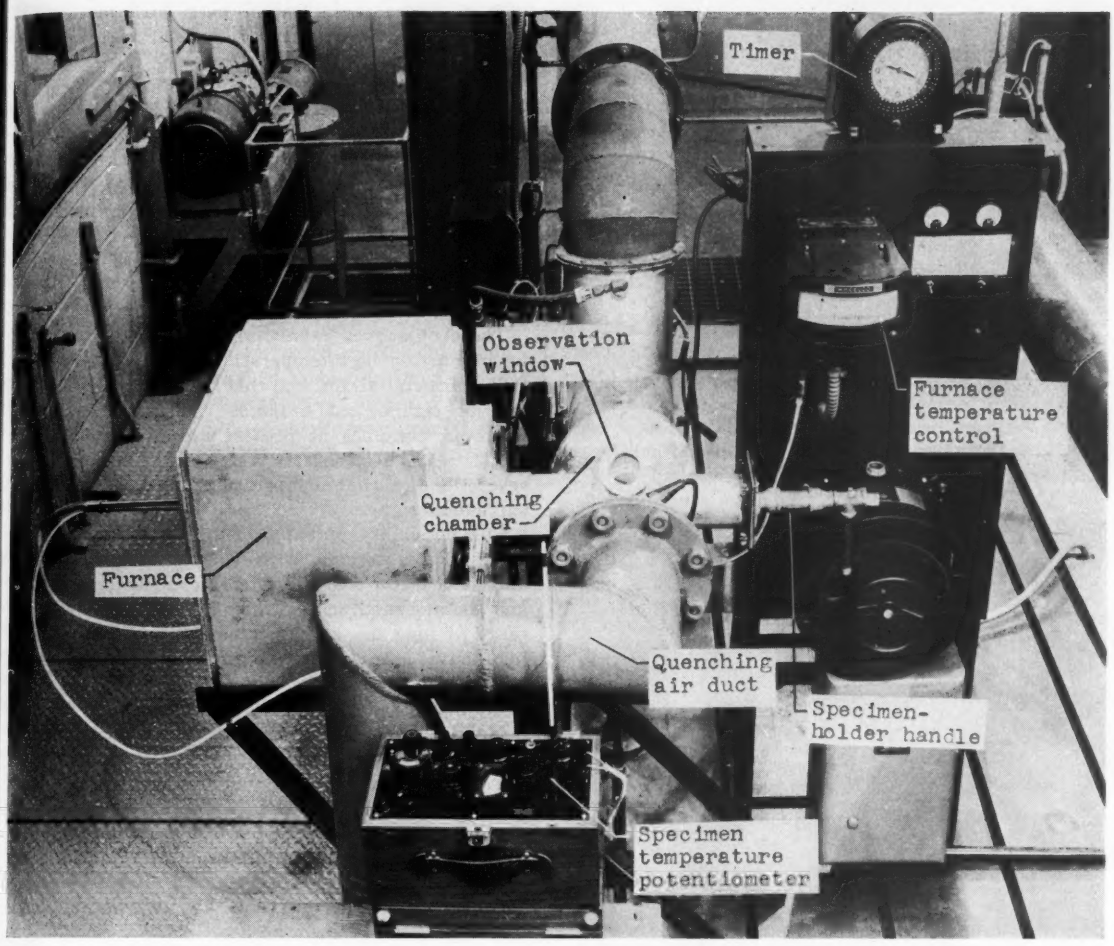
HEAT RESISTANT ALLOYS AND STRESS-RUPTURE PROPERTIES AT FOUR ELEVATED TEMPERATURES

Data supplied by National Advisory Committee for Aeronautics Lewis Flight Propulsion Laboratory

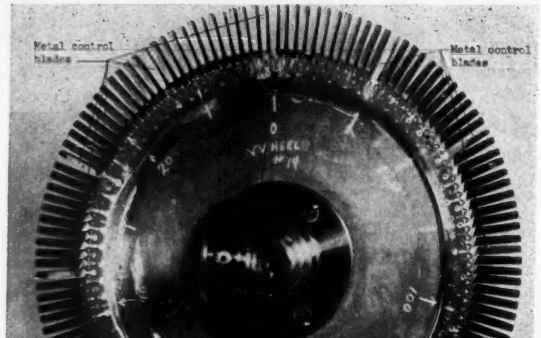
Alloy	Chemistry, per cent C	Cr	Ni	Co	Mo	W	Cb	Ti
Discaloy	0.03	13	24	..	3	..	..	2.5
EME	0.1	19	12	..	..	3.2	1.2	..
Gamma Columbium	0.4	15	25	..	4.4	..	2	..
Hastelloy B	0.12	0.27	64	..	29	..	..	..
Inconel	0.05	14	78	..	..	..	..	..
Inconel-W (A-H)	0.05	14	75	..	..	..	..	2.5
Inconel-X (Cb Mod)	0.05	15	73	..	..	..	1	2.5
K-42-B	0.06	18	42	22	..	..	..	2.6
N 155	0.3	20	20	20	3	2	1	..
Nimonic 80	0.05	21	75	..	..	..	..	2.5
Refractalloy 26	0.04	18	37	20	3	..	..	3
S 590	0.4	21	20	20	4	4	4	..
S 816	0.4	20	20	44	4	4	4	..
S 844	0.3	25	20	46	2	2	2	..
Stellite No. 6	1.3	27	..	65	..	4	..	..
Timken (16-25-561)	0.15	16	25	..	6	..	..	..
Vitallium	0.2	28	2.5	62	5.5	..	..	..
X-40	0.5	25	10	55	..	7	..	..
X-50	0.8	22	20	45	..	12	..	..
17 W	0.5	13	19	..	2	2.5	..	..
19-9 DL	0.3	19	9	..	2	1.2	0.3	..
234-A-5	0.4	18	5	..	1.5	1.5	0.7	..
422-19	0.4	26	15	51	6	..	..	..
6059	0.4	26	33	33	5	..	..	..
61	0.4	24	1	67	..	5	..	..

Blade Materials

By A. H. ALLEN
Associate Editor



	1200° F				1350° F				1500° F				1800° F				
	100 hr.		1000 hr.		100 hr.		1000 hr.		100 hr.		1000 hr.		100 hr.		1000 hr.		
	SR 1000 PSI	Merit order %	SR 1000 PSI	Merit order %	SR 1000 PSI	Merit order %	SR 1000 PSI	Merit order %	SR 1000 PSI	Merit order %	SR 1000 PSI	Merit order %	SR 1000 PSI	Merit order %	SR 1000 PSI	Merit order %	Alloy
2.6	52	70	39	75	..	..	..	..	..	..	..	..	..	..	..	..	Discaloy
	45	61	..	..	22	45	..	..	..	..	..	..	..	..	..	..	EME
0.04	40	54	29	56	26	53	19	49	16.7	57	11	42	..	..	..	..	Gamma Columbium
	56	76	33	63	..	..	..	..	16.8	57	10.3	40	..	..	..	..	Hastelloy B
0.2	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	Inconel
0.1 / 0.6	59	80	39	75	32	65	16.5	42	..	..	..	..	..	..	..	..	Inconel-W (A-H)
	58	78	55	..	48	100	39	100	29	98	18	..	..	..	..	..	Inconel-X (Cb Mod)
0.6	53	72	32	62	..	..	..	..	10.8	37	7.9	30	..	..	..	..	K-42-B
0.11	55	74	42	81	31	63	24.5	63	18.8	64	12.5	..	4.9	43	..	..	N 155
0.6	49	61	39	75	36	74	23.5	60	17.2	58	7.7	30	..	..	..	..	Nimonic 80
0.3	74	100	..	..	48	98	..	..	26.5	90	..	..	..	..	..	..	Refractalloy 26
	..	..	..	..	32.5	66	26	67	20	68	16	61	..	..	..	..	S 590
	62	84	52	100	35	71	30	77	24.2	82	18.8	72	5.3	47	3	31	S 816
	..	..	..	..	36	74	28	72	..	..	..	..	..	..	..	..	S 844
2.7	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	Stellite No. 6
0.18	50	68	38	73	28.5	58	18.5	48	13.8	47	9	35	..	..	..	..	Timken (16-25-51)
	52	70	41	79	36.5	75	27.5	71	21.5	73	15	58	9	80	5.8	59	Vitallium
	..	..	..	..	..	..	..	..	28.5	93	26	100	11.3	100	9.8	100	X-40
	..	..	..	..	..	..	..	..	29.5	100	22	85	9.7	86	7.7	79	X-50
	55	74	31	60	..	..	..	..	..	..	..	..	..	..	..	..	17 W
	40	54	34	65	23	47	15	38	13.3	45	10	38	..	..	..	..	19-9 DL
	35.5	48	30	58	22.5	46	12.5	32	..	..	..	..	..	..	..	..	234-A-5
	..	..	..	..	47	96	36	92	26.5	90	20	77	10	88	7.1	73	422-19
	45.5	62	39.5	76	34.5	70	27	69	23.5	80	19.5	75	9.3	83	6.8	69	6059
	51.5	70	42	81	35	72	27	69	28	95	23.5	91	8.6	76	5.4	55	61



Turbine test wheel assembly from the upstream side showing location of ceramal blades and 12 metal "control" blades

Typical fracture of ceramal blade, flanked by metal blades, during quasi-service evaluation test

Four types of failure of small cast vitallium turbine blades. First shows no necking but appears to have cracked at both edges and at the center. Second has cracked at the center and one edge only, bending resulting from centrifugal force. Third has necked and subsequently cracked outside the region of necking. Fourth illustrates cracking and necking outside the failure zone

cision of investment castings and compressed and sintered metal powders. An advantage of both is that they conserve material because of no scrap loss to speak of, while powders have the further advantage of a saving in weight over solid material by virtue of their lower density, even at high compacting pressures.

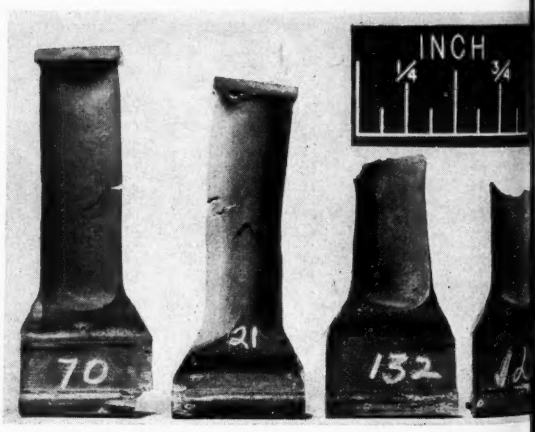
Ceramics Are Considered—Service life of metal turbine blades is relatively short at extremes of operating temperatures and the ultimate operating temperature of such blades is limited by the melting point of their lowest melting constituent, generally between 2300 and 2500°F. Research on blade materials is guided by these goals: Longer life at the relatively low temperatures of 1450-1550°F, a practical life at temperatures of 1550-1800°F and a short but useful life at temperatures above 1800°F.

These objectives necessitate research on materials having better high-temperature characteristics than those of metal alloys, and this had led to a consideration of ceramic materials as a possible substitute. However, ceramics at present are poor in thermal-shock properties, that is, their ability to withstand severe and abrupt temperature fluctuations of the surrounding gas.

The possibility of supplementing desirable characteristics of a ceramic with the thermal-shock resistance of a metal has suggested a composite of ceramic and metal constituents which would result in a material of long life at high temperatures. Such products have been termed ceramals. The earliest research on ceramals for gas turbines was conducted in Germany.

Molybdenum Disilicide Interesting—A carbide-type ceramal investigated by NACA is a mixture of titanium carbide and 5-30 per cent nickel powder. Other metal powders have been used with the carbide, including cobalt, iron, tungsten and molybdenum, much of the NACA work having been with cobalt. Another powder tested experimentally in blades is molybdenum disilicide ($MoSi_2$), an intermetallic compound received in a fineness of −325 mesh and further ground to micron size. Green blade compacts are sintered at about 3000°F in the case of ceramals and 2400-2700°F for the silicide.

Problems with these types of blades are numerous,



although seemingly not insurmountable. The fundamentals of sintering practice need considerable study, along with the phenomena of densification on an atomic scale. Beyond that the design of blade roots is a critical factor. Being a brittle material, sintered ceramal is difficult to load uniformly in testing various methods of retaining formed blades in turbine wheels. The first idea was simply to duplicate the design of a solid alloy blade, using a more generous radius in the root. Conventional methods of peening blades into wheels were impractical with the sintered blades since they concentrated stresses. The best arrangement discovered thus far is to coat the blade root with a ductile material such as 0.010-0.012-inch of copper plate before mounting it in the wheel. Casting of a ductile alloy slug around the root of the ceramal blade also has been tried.

A mixture of aluminum oxide and chromium powder has been given extended test in the form of turbine blades. It has further been proposed that a ceramal might make an excellent coating material for high-alloy combustion chambers of gas turbines, possibly permitting some reduction in alloy content of the base metal.

Coated Blades Look Good—Test wheels have been run with ceramic coated blades, with the idea that this might conserve alloys by permitting a switch to an iron-base blade material which might otherwise corrode. One group of tests involved very thin coatings of the chromium oxide type fired at 1700°F for 10 minutes. To measure the adherence of the coatings, the test wheel was run on cycles of 5 minutes idling and 15 minutes full speed over a period of 35 hours, and the coating adhered to the blade despite the high rotational speed.

To determine the effect of thermal shock on blades of metal and ceramal powders, sample ¼x2-inch disks of various compositions were heated to 1800°F and quenched in an air stream moving at 400 feet per second, this being done 25 times in succession, after which the same procedure was followed at 200-degree higher temperature until a maximum exposure at 2400°F was reached.[1]

Apparatus for thermal shock evaluation is shown in an accompanying illustration. It comprises an electric furnace with nonmetallic resistor bars to heat the specimen and an air-quenching system. Holders of high-temperature alloy are used to support and to transport the specimens from the furnace to the air stream. Specimens are placed in the air stream so that the flat surfaces are parallel to the flow of air. Inspection for internal and external flaws is done by radiographic and fluorescent oil methods, respectively, and the appearance of a crack is considered to be a failure.

A small gas turbine supplied with hot gases from a turbojet combustion chamber is used for quasi-service evaluation of the ceramal blades. Wheel diameter is about 9½ inches and the blades extend 1.3 inches beyond the wheel.

Thermal shock resistance of the carbide-type ceramal proved to be excellent compared with zircon ceramic, for example, and good compared with titanium carbide ceramic. The ceramal survived 25 thermal shock cycles at 1800°F, at 2000°F, at 2200°F and at 2400°F, whereas the zircon ceramic survived one cycle at 1800 and the titanium carbide 21 cycles at 2400. During operation, a film consisting of two layers formed on the ceramal blades, the outer layer being mainly titanium dioxide or rutile and the inner layer mainly cobalt titanate. As in all laboratory testing procedures, the correla- (*Please turn to Page* 101)

COMPARATIVE STRESSES FOR FRACTURE IN 50, 150, AND 500 HOURS FOR VARIOUS TESTS

Type test	Data source	Test temp. (°F)	Tensile test properties: Ultimate (psi)	Tensile test properties: 0.2% offset (psi)	Tensile test properties: Proportional limit (psi)	Stress (psi) for fracture in — 50 hours	150 hours	500 hours
Tensile	U. of M.	Room	119,000	60,500	40,500	.....	.....	.....
Reversed bending	Westinghouse	Room				±55,000	±55,000	±55,000
Reversed bending	Lewis Lab, NACA	Room				±55,000	±55,000	±55,000
Tensile	U. of M.	1000	94,000	38,000	26,000	.....	.....	.....
Rupture	U. of M.	1000	.....	.....	.....	82,500	74,000	67,000
Sonntag axial fatigue	Elliott	1000	.....	.....	.....	75,000 ±13,000	75,000 ±10,000	.....
						60,000 ±21,000	60,000 ±18,000	60,000 ±13,000
						45,000 ±25,000	45,000 ±22,000	45,000 ±49,000
Reversed bending	Westinghouse	1000	.....	.....	.....	±49,000	±49,000	±49,000
Tensile	U. of M.	1200	80,500	35,500	26,000	.....	.....	.....
Rupture	U. of M.	1200	.....	.....	.....	54,000	44,000	41,000
Krause axial fatigue	Battelle	1200	.....	.....	.....	49,500 ±7,500	45,000 ±7,500	40,500 ±7,500
						44,000 ±15,000	40,500 ±15,000	36,500 ±15,000
						36,000 ±25,000	33,000 ±25,000	29,000 ±25,000
Reversed bending	Westinghouse	1200	.....	.....	.....	±46,500	±46,500	±46,500
Tensile	U. of M.	1350	60,000	37,000	23,000	.....	.....	.....
Rupture	U. of M.	1350	.....	.....	.....	32,000	28,500	25,000
Rupture	Syracuse	1350	.....	.....	.....	32,000	28,000	23,750
Axial fatigue	Syracuse	1350	.....	.....	.....	31,250 ±7,800	28,000 ±7,000	24,000 ±6,000
						26,500 ±17,700	24,500 ±16,400	22,000 ±14,700
Krause axial fatigue	Battelle	1350	.....	.....	.....	33,000 ±7,500	28,750 ±7,500	24,000 ±7,500
						29,000 ±15,000	26,500 ±15,000	23,000 ±15,000
						26,000 ±25,000	10,000 ±35,000	
							0 ±40,000	
Reversed bending	Westinghouse	1350	.....	.....	.....	±39,000	±39,000	±39,000
Rotating cantilever beam	NEES	1350	.....	.....	.....	±36,000	±36,000	±36,000
Reversed bending	Lewis Lab, NACA	1350	.....	.....	.....	±39,000	±39,000	±39,000
Tensile	U. of M.	1500	44,600	35,800	20,000	.....	.....	.....
Rupture	U. of M.	1500	.....	.....	.....	20,000	17,000	14,500
Rupture	Syracuse	1500	.....	.....	.....	19,000	16,250	12,750
Axial fatigue	Syracuse	1500	.....	.....	.....	19,750 ±4,900	17,250 ±4,300	14,500 ±3,600
						18,500 ±12,300	15,500 ±10,400	13,000 ±8,700
						13,000 ±26,000	12,000 ±24,000	10,750 ±21,000
Zero mean	Syracuse	1500				±29,300	±28,000	±27,500
Krause axial fatigue	Battelle	1500	.....	.....	.....	19,750 ±7,500	17,000 ±7,500	14,000 ±7,500
						18,500 ±15,000	16,000 ±15,000	13,750 ±15,000
Reversed bending	Westinghouse	1500	.....	.....	.....	±29,500	±27,500	±25,500

Aircraft Part Str
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AIRCRAFT builders are depending more and more upon stretch forming as a method of forming sheet metal and extrusions into the many varied shapes required. Continued trend toward more complex structural design requires a higher percentage of parts formed to compound curvatures. Many of these parts do not have severe forming or reverse bends, and therefore may be fabricated readily by a single stretching operation.

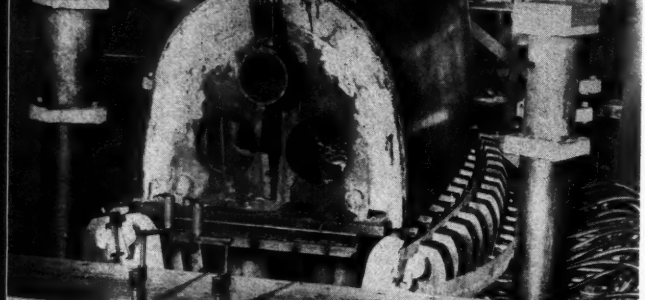
Major Advantage—Accuracy—The two major advantages of stretch forming are: (1) Accuracy with which the required contours may be achieved; and, (2) low cost of stretch forming tools. Parts which must be severely formed or which have reverse curvatures are fabricated more easily on drop hammer or conventional punch press dies. The major disadvantage to the stretch forming technique as commonly used is the necessity for specialized equipment. This equipment is by nature suited only to stretch forming and represents a large capital expenditure.

In 1947 Rohr Aircraft Corp. installed a 750-ton Clearing, measuring 90 inches front to back and 138 inches left to right. This is one of the largest double-acting mechanical presses on the West Coast. The machine has a maximum shut-height of 81 inches and an air cushion in the base making it ideally suited for a wide variety of applications.

Almost continuous research has been carried on throughout the past four years toward the end of using this machine for an ever increasing number of different types of forming applications. Quick change standard adapters have been developed which permit the ready installation of relatively small dies into this large machine.

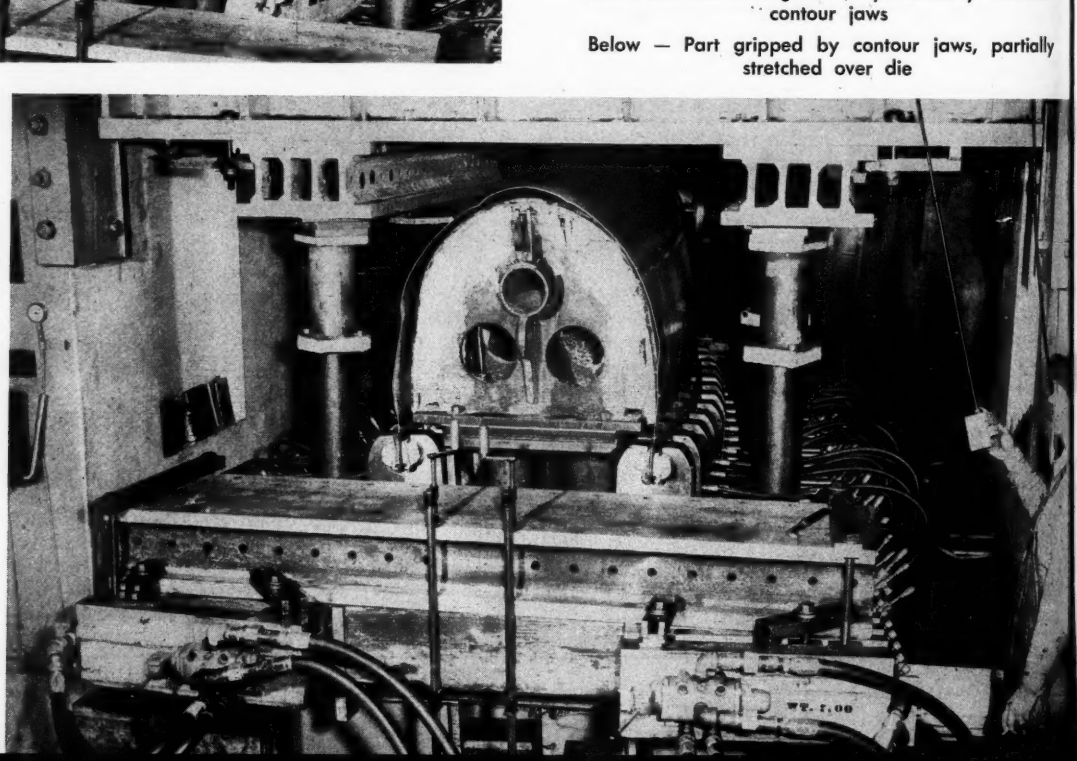
Three Systems Evolved—By evolution three different systems for stretch forming have been developed. Two of these are presently being used. One employs two straight line material gripping jaws; the other uses segmented material gripping jaws which may be arranged in either a straight or a contoured configuration.

The male form die is rigidly fixed to the bolster plate ordinarily with its major dimension extending in the front to back direction. The jaws which hold the work piece are, in the case of the straight line application integrally designed into one piece units



Left—Form die arrangement, hydraulically actuated contour jaws

Below — Part gripped by contour jaws, partially stretched over die



By B. F. RAYNES
Chief Tooling Engineer
Rohr Aircraft Corp.
Chula Vista, Calif.

Stretch-Formed Mechanical Presses

which are attached to the beams supported by pressure pins bearing on the cushion. These jaws are so positioned on either side of the form die as to conform to the approximate plan view shape of the die. They are separated from one another by large adjustable turnbuckles which permit them to be arranged in a parallel or angular relationship to one another. The jaws are actuated by wedge-shaped beams which are attached by columns to either the inner or outer slides of the press.

Gripping and Cushioning — First action of these beams is to cause the closing of the jaws on the work piece, gripping it securely before the downward motion commences. The gripping action is proportional to the cushion pressure used. As the beams continue their downward motion the entire jaw assembly is caused to move downward carrying the ends of the work piece with it. The sheet metal is pulled over the form die in a stretching and curving motion and thus the work piece is stretched to conform to the shape of the die.

Upward motion of the press permits the cushion pressure pins to carry the clamping jaw assemblies up to their starting position and the jaws are then released allowing the formed parts to be removed. The shut-height of the press is adjusted to achieve the proper degree of stretch in the material being formed. Production rates of 120 pieces per hour are readily achieved.

Jaws Hydraulically Actuated—Use of individually hydraulically actuated workholding jaws which may be arranged to suit the contour of the form die is a later development and offers several distinct advantages not to be achieved by any stretching system which is limited to a straight line material gripping configuration. In this arrangement, two large beams are supported on cushion pressure pins. These beams may be arranged in virtually any relationship to each other and are tied together by cross-beams at some point near their ends. A series of T-slots cut across the beams is an integral part of the upper flange of the beams.

Individual jaws 4 or 8 inches long are attached to the beams by means of the T-slots and may be arranged in an infinite variety of single or double curvature configurations to best accommodate the particular part being stretch formed. The work piece may be a square shear cut or preformed part and when inserted in the jaws is clamped by the application of hydraulic pressure. Columns attached to the inner or outer slides of the press engage the main beams, which carry the jaws and work piece, driving them downward, thereby accomplishing the required forming operation. Action of the cushion through the pressure pins returns the beams, jaws and formed work piece to their original positions.

Contoured Jaws Used—Use of contoured jaws is a vital step forward in the technique of stretch forming since it permits the forming of parts which could not possibly be formed by straight jaws. Similarly, on more readily formed parts, contoured jaws permit a considerable material saving since the blank size may be reduced to a minimum. The design of stretch jaws is a very critical part of any stretching equipment. The jaws must be able to grip the material to prevent slipping and yet not cause mars, indentations or scratches which would lead to premature breakage of the blank. The holding of the harder grades, ¼, ½, ¾, and full hard stainless is most difficult since these materials are usually rather thin and have a smooth hard surface. The hydraulically actuated jaws shown in the accompanying photographs have a capacity in excess of 5 tons per running inch.

Use of standard mechanical or hydraulic presses is not necessarily advocated as a substitute for the more specialized stretch forming machines, but their use does seem to offer advantages in many cases. In the event of a national emergency the methods which have been developed at Rohr for stretch forming on conventional presses would be of invaluable aid in that they would permit the production of stretch formed aircraft parts on the multitude of conventional hydraulic and mechanical presses available outside the aircraft industry.

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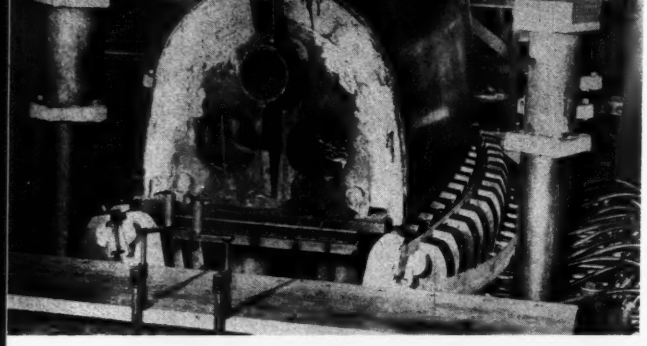

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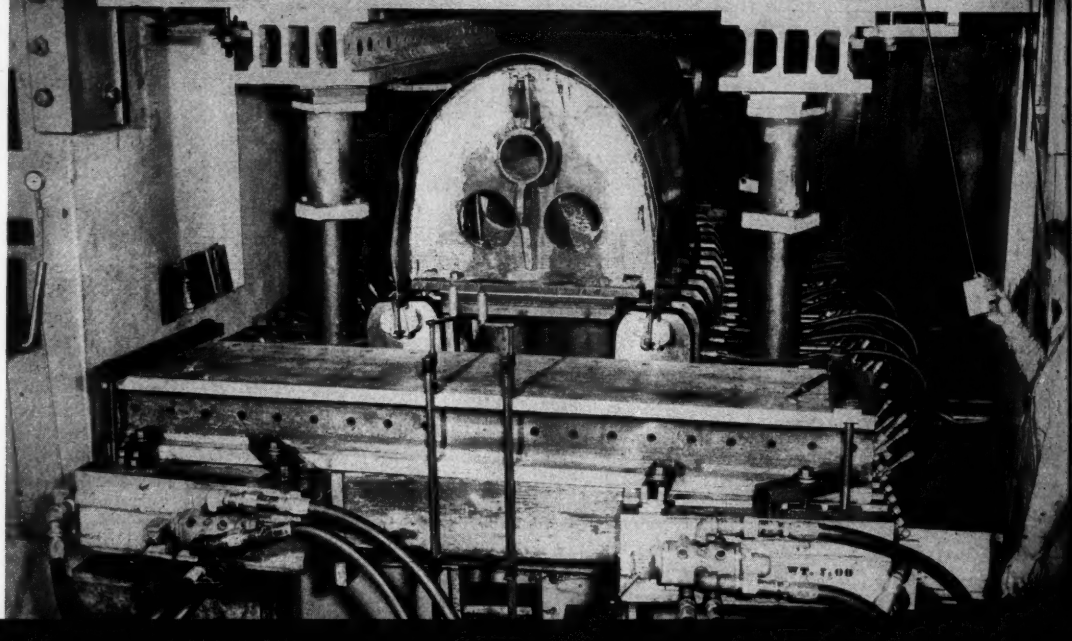

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Tube Bender Forms Shee

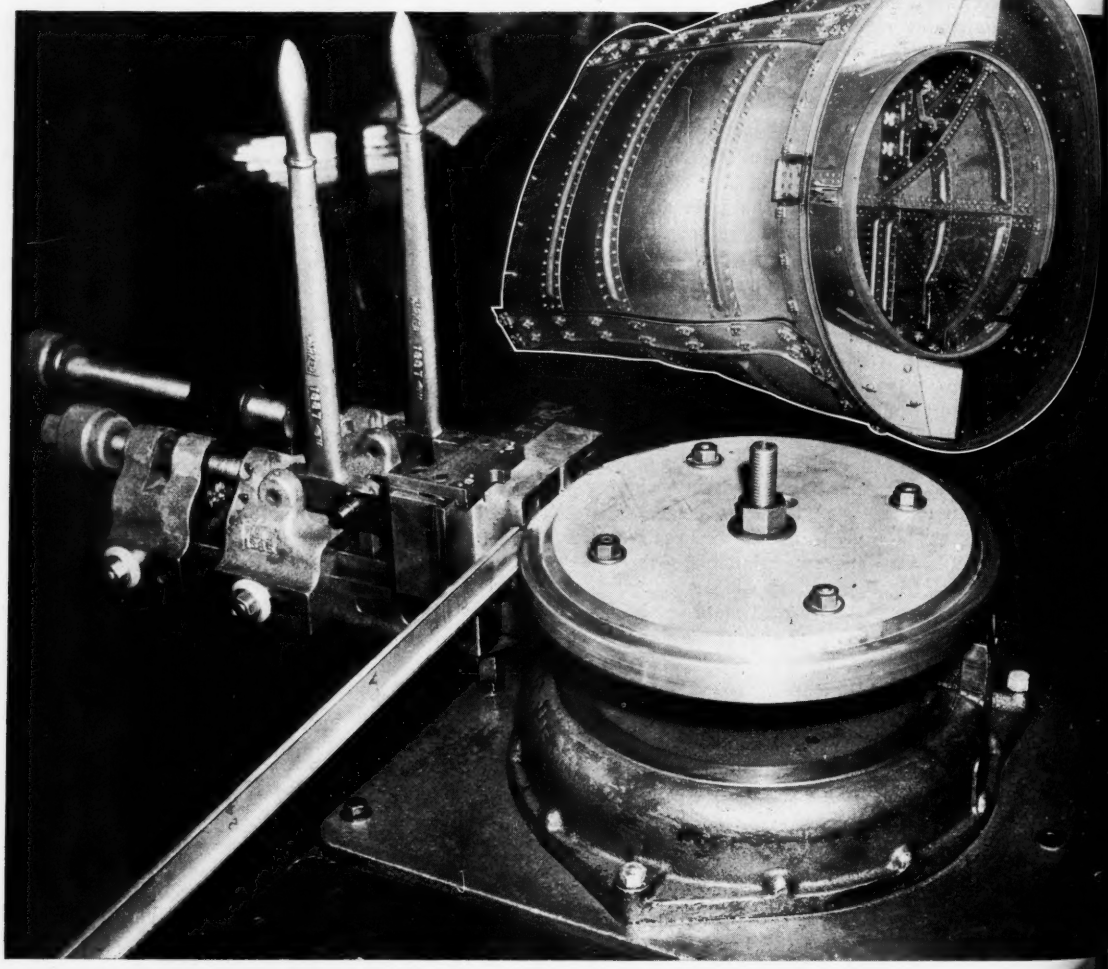
Collars or U-shaped parts having angle, channel, hat or similar section are readily produced in a simple setup using only inexpensive plastic tools

ADVENT of turbojet engines in such aircraft makes necessary the employment of ducts, shrouds and tailpipes that pass through the airplane fuselage. In general, these parts are nonstructural in the sense that they are not subject to heavy stresses. Consequently, to save weight, comparatively light gage metal is employed and stiffeners having channel, hat or angle sections, are provided and commonly have to be formed into collars or rings or must be bent to conform to mating components. Some U-shaped parts are among those needed.

Standard Bender Used—Although some collars could be produced by bending rolls of suitable design, Republic has found it easier and less expensive to use a standard tube bender, partly because the forms and shoes needed can be machined readily from laminated phenolic or similar plastic blocks. In such bending, neither the flange (or flanges) nor web may have kinks or scratches. They are prevented by having the forms and wiping shoes made to proper contour so as to fit closely the section employed. Such sections may be rolled from sheet stock or formed in a press brake; they can also be extruded.

The bending machine used has a head that is turned slowly and carries the form whose periphery is shaped to fit the work and has the necessary radius. In general, the form is turned from laminated stock and is bolted against a circular steel flange of somewhat smaller radius.

Shoe Holds Work—Fastened to the fixed side arm of the machine is a shoe. This shoe is grooved on its outer face to fit the outer face of the stock be-



Metal Components

By ADOLPH KASTELOWITZ
Chief Tool Engineer
Republic Aviation Corp.
Farmingdale, N. Y.

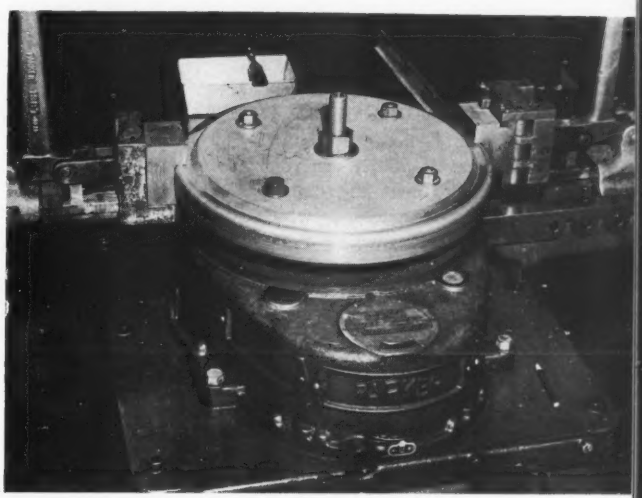
fore it is bent and is fastened to a backing block arranged to be moved radially by a toggle operated by a hand lever. When advanced to the operating position, the shoes press the work piece firmly against the form.

A similar shoe is attached to a second arm arranged to swing with the form about the same center. Its face also mates with the work piece but may be curved to fit it after it is bent. Its function is to clamp the work to the form and to hold it there as the rotation of the form pulls the work piece between the first shoe and the form.

Any Shape Formed—Although the form generally is circular, it can be elliptical or have some other shape, such as a portion of a spiral, if necessary, as long as abrupt bends are not needed. In such cases, as the radius varies, the forming shoe has to be backed by a heavy spring or by an air operated plunger that maintains suitable pressure but permits the shoe to move radially as the form rotates.

It is not necessary, of course, to produce a complete collar 180-degrees. U-bends can be made or bends of greater or less degrees, either at the end of a piece or at an intermediate point while other portions remain unbent.

Setups are quickly and easily made and it requires only a short time per piece to perform the bending operation.



Top Left—Complete engine air duct includes numerous collars formed in a tube bending machine

Left—Starting a channel section strip around the bending form. First shoe at left presses the piece against the form

Above—Same setup shown in previous illustration as seen after a collar of channel section is nearly formed. Shoe at left turns with the form and clamps work piece against the form

View of setup for bending a collar for a tail pipe. The collar is about three-fourths completed

Machine Tools Self-Controlled By Air-Electric Gage System

Grinding and rolling determine air flow through "caliper heads." Pressure variations actuate diaphragm switches. Approach to and attainment to exact dimensions are instantaneously reported by signal lights

By GUY HUBBARD
Machine Tool Editor

WITH increasing productive speed of grinders and other precision machine tools and constantly tightened limits on dimensions of their work, a growing need has developed for machine-mounted gaging devices which will keep pace with modern machining methods. This need now is intensified by general adoption of quality control systems and by necessity for employment of semiskilled men and women as operators of machines which formerly required highly skilled personnel.

In view of this situation, considerable interest is being shown by American machine tool builders and users in a differential pressure pneumatic-electric system of gaging and co-ordinated machine control recently introduced in this country by Ateliers de Normandie, Paris, France.

Controls Piston Pin Grinding — This so-called Etamic system, already in wide use in the Renault, Peugeot and Citroen plants, and in the International Business Machines factory in France, was exhibited at the 1950 International Trade Fair in Chicago. Since then installations have been made at Landis Tool Co., Waynesboro, Pa., and one is now being engineered for Ford Motor Co., to provide size control on grinding of piston pins. An illustration of the Landis plain cylindrical grinder application appears herewith, showing the machine in operation.

The relatively simple theory underlying this size control system is revealed by the accompanying diagram, showing the type of gaging head used on the Landis grinder. This jaw-type head has two fixed carbide contact anvils and a work contacting gaging finger—the latter floating—in the gaging vent marked O_1. This floating finger partially and variably blocks the main air channel marked 1, which has a calibrated area at O_3.

Compressed air enters the system at standard shop air line pressure (it should not be less than 60 pounds per square inch) at point S. Branching off at this point are two channels marked 2 and 3 which are calibrated at points O_4 and O_5 and which can be opened and closed at points O_6 and O_7 by micrometer needle valves R_1 and R_2.

Three-Stage Signals — Connecting across between the three primary air channels is a secondary channel in which are mounted diaphragm chambers M_1 and M_2. Their diaphragms serve as elements of electrical contacts which act to switch on and off green light LV and red light LR. The needle valves are regulated so as to cause the device to signal three

Air-electric gage of contact finger type in use on Landis cylindrical grinder. Casing with two knobs on top of machine houses needle valves and diaphragm switches which actuate adjoining signal lights

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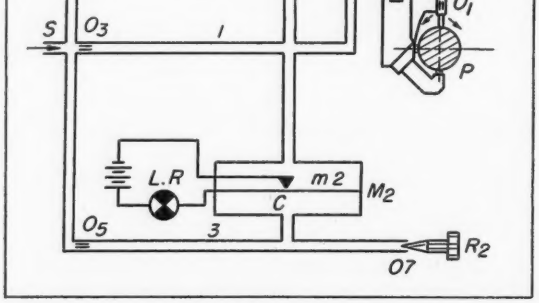
stages in the sizing of work piece P—one from the rough size to a size close to finished diameter, another in the intermediate zone, and a third exactly to finished diameter.

When the part still has the above-mentioned small amount of material to be removed, air pressure in channel 1 continues to be higher than in channels 2 and 3. Diaphragm M_1 therefore acts to switch on the green light, whereas diaphragm M_2 moves in the opposite direction and so keeps the red light switched off. As the work diameter passes this "outer" limit and enters the intermediate or "critical" zone, air pressure in channel 1 drops below that in channel 2 but remains higher than in channel 3. This shuts off the green light; both green and red lights are off.

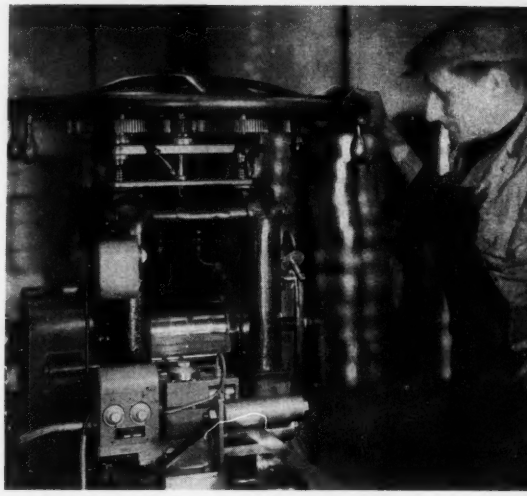
Finally, when the exact diameter is arrived at, air pressure in channel 1 falls below the pressures in channel 3 and the red light is glowing. This of course is a signal to stop the machine and remove the finished work. Automatic controls can be arranged whereby the electrical system acts through relays to stop the machine when exact size has been arrived at. This enables one operator to run several machines. The Landis grinder illustrated, incorporates the tripping feature.

Slot Type Gaging Element—In addition to the contact finger type gaging element shown in the diagram and grinder illustration, one of so-called slot type also can be provided. In this setup the gaging head is fitted with a nozzle from which the airstream impinges directly on the surface of the work—the nozzle itself having no contact with the work. This arrangement can only be used, however, on parts which already have been rough machined within 0.050 mm of finished diameter, since clearance between nozzle and work surface cannot exceed that amount.

The pneumatic-electric system of gaging also has been applied to automatic sorting of parts produced in centerless grinders—in this case interchangeable



Schematic diagram of air-electric gaging system, showing contact finger caliper head operating on cylindrical work



Application of the system as "flying gage" to control thickness of strip metal being finished in a small French cold rolling mill. Operator watches signal lights, ready to readjust rolls to hold close limits

air ring gages being mounted at the downstream end of the measuring channel. The needle valves are so adjusted that when the size of a part is below minimum, one of the diaphragm switches closes, when its size exceeds maximum allowance, the other switch closes, and when the size falls between maximum and minimum limits, both switches open.

A "memory" device is tied into the system to actuate an automatic sorting device which diverts the parts into "good", "oversize" and "undersize" bins at the outlet end of the machine. In some cases additional apparatus is employed to make the machine adjust itself to correct the work size. The system also is applied to bore grinding, through use of fixed size plug gages through which flow of air is maintained. A similar setup is employed for bench gaging of bores, in connection with instruments with direct-reading dials giving bore dimensions.

Controls Strip Thickness—The system also is applied as a flying gage control of strip rolling and wire drawing operations. One of the photographs illustrates the system as applied at Compagnie Generale du Duralumin et du Cuivre, Vitry-sur-Seine, France, to a small metal strip finish rolling mill. The pneumatic and electric circuits in this case are identical to those shown in accompanying diagram, with the exception that the single orifice calibrating head at outlet of channel 1 is replaced by a double orifice outlet. One nozzle discharges air against the top of the strip, the other against the bottom—flow being divided between them.

The moving strip travels through a roll support in such manner that neither of the nozzles comes into actual contact with the strip. The nozzles are built into this roll guide—which appears in the illustration behind a pair of secondary support rolls. The operator is watching the signal lights, ready to readjust the sizing rolls in case the lights warn him that the strip is beginning to run either too thick or too thin.

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AUTOMATIC HONING

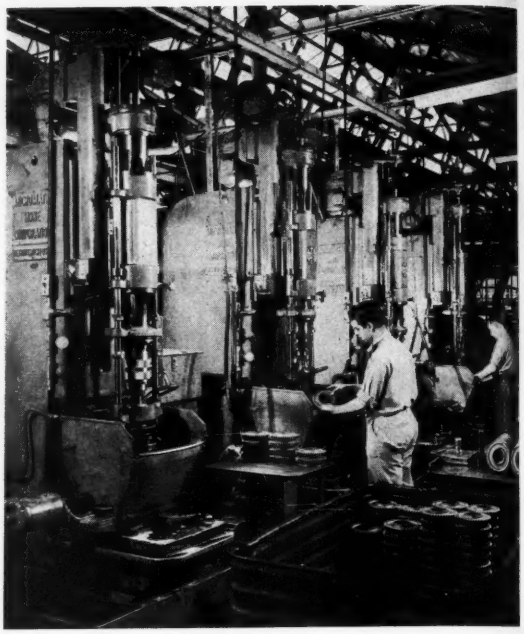
Finishes Gear Splines to Close Limits

By H. C. TUTTLE
Detroit Editor

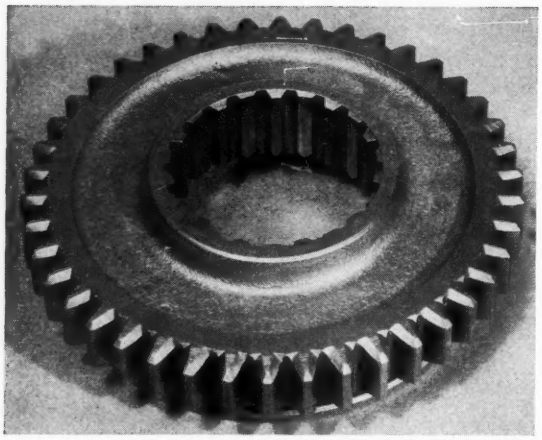
DIFFICULTIES being experienced in obtaining the desired fit between the low-speed sliding gear and mainshaft in a Chevrolet truck transmission of the synchromesh type were diagnosed as resulting from the lack of a more positive mounting for the gear than was provided by the 22 side-fitting involute splines. Working on a new design, engineers decided to reduce the number of full spline keys of the gear to 11, cutting back every other key to the pitch line so that a qualified and hard bearing surface would be offered to mate with the ground OD of the mainshaft.

Of the various practical finishing methods available, honing was selected for the final qualifying operation on these mounting surfaces. The alternate, and higher, keys required no finish operation; the lower ones, however, would have to be honed over their entire surface.

Special Equipment Devised — Micromatic Hone Corp., Detroit, worked out an adaptation of honing practice to meet the exacting dimensional requirements of the redesigned gear. In the conventional honing application the tool with its stones is rotated as it is reciprocated through the bore. This motion brings the full area of every stone in contact with the entire surface of the work. It is limited to work which has no projections to interfere with the stone's travel. To hone splines, therefore, a tool was designed with a stone for each spline. The stones are approximately half as wide as the spline. The rotation is replaced by an oscillating motion. The stone is swept across the spline as the tool is reciprocated. This gives a pattern to the finish similar to the distinctive honing cross-hatch. To get coverage by all stones, the part is indexed periodically and automatically.



Four heavy-duty honing machines finish splines on truck transmission gears. Honing removes out-of-round and taper, giving a bearing surface meeting exacting dimensional requirements



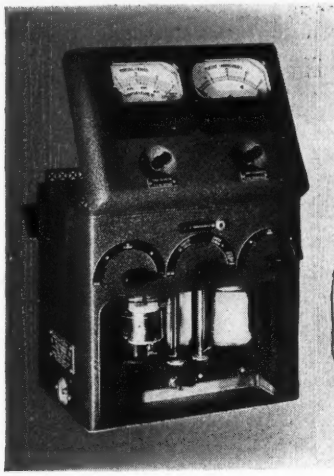
Low-speed sliding gear as redesigned has 11 spline keys which are honed and 11 on which no finish operation is needed

The part is hardened to 60 Rockwell C and although careful control over the heat treating operation is exercised, the hole may become out of round and tapered as much as 0.006-in. To remove this much stock and bring the finish dimensions within 0.001-in. tolerance requires an unusual operating cycle.

The gear is positioned in the fixture by a disappearing locating plug and clamped by three cam-operated fingers. The tool is then lowered into the hole where the stones move outward automatically, contacting the surface of the splines. High points are encountered first so if the gear is out of round only two or three may be in contact. After a predetermined number of strokes, internal expansion of the stones is stopped, the tool is withdrawn automatically and the gear indexes. The tool then re-enters the work, again with the stones expanding at a controlled rate so that a different set is working on the tight splines.

Gage Ring Stops Operation—This operation repeats automatically until all inaccuracy is removed and an equal abrading action then takes place on all splines. When they reach the desired dimensions, the stones make contact with a gage ring which ends the cycle

Not an instrument you buy... but a service we supply



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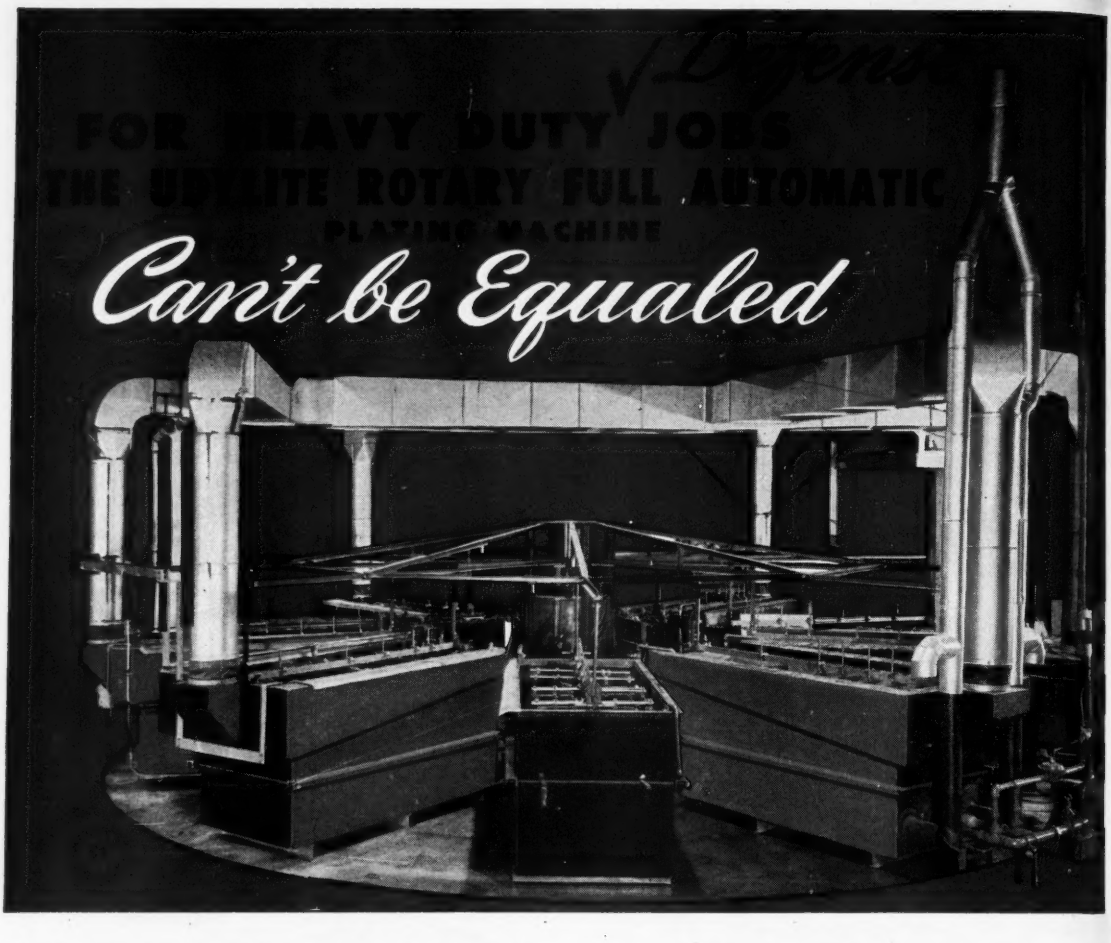

Here's the heavyweight champ of the metal finishing field—designed especially for those tough defense jobs—Udylite's Rotary Full Automatic. The tremendous power and flexibility of its hydraulic drive make a simple matter of processing work pieces of any size or shape. It's ideal for pickling and bonderizing shell and rocket casings—for etching stainless steel jet engine rotors—anodizing aluminum aircraft parts. It can handle any metal finishing operation vital to building the sinews of defense.

Mechanically simple, the Udylite Rotary is constructed in the shape of a cartwheel. The tanks may be arranged radially around the lift shaft like the spokes of a wheel or placed end to end like a wheel's rim. Either arrangement allows easy access to the tanks for servicing the solution. This machine is very easy to install—it is shipped ready to run. Since it has few moving parts, maintenance is held to a minimum. If you have a large volume of heavy parts production, it will pay you to ask your Udylite Technical Man about the Rotary Full Automatic for plating and other metal finishing processes. Or, if you prefer, write to us direct for full information. There's no obligation.

PIONEER OF A BETTER WAY IN PLATING

THE Udylite CORPORATION
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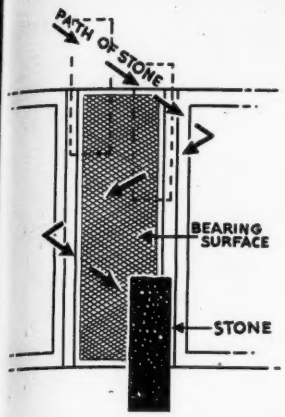


Entire surface of the abrading action of spline is under the the stone. Different stones are brought to bear until all inaccuracies are removed

by collapsing the stones and withdrawing the tool.

As a safety feature, the four machines in Chevrolet's installation at Toledo, O., have been equipped with red and green lights, the red being automatically lighted when the tool first begins its descent into the work and remaining on throughout the withdrawal, indexing and reinsertion sequence.

To prevent short circuiting of the electrical control elements of the machine by metal particles which would cause the tool to withdraw prematurely, a magnetic collector has been installed in the coolant circulating system.

Engineers Discuss Corrosion

Tremendous increase of industry electrification in recent years has multiplied corrosion problems in control equipment, the American Institute of Electrical Engineers was told during the Pacific general meeting.

Harold E. Springer, of the Rayonier Co., in a technical paper, revealed that corrosion of mechanical and current-carrying electrical apparatus "works havoc in varying degrees in many industries." He said corrosion is likely to be encountered in any plant which manufactures or uses chemicals, whether in a liquid, gaseous or dust form. Such industries include pulp and paper mills and cement and chemical plants. Corrosion also is likely to occur in plants near salt water, in mining operations and in wood cut-up plants.

He said that corrosion can cause costly and inconvenient shutdowns, and may be a safety hazard, and recommended study of atmospheric conditions before installing or replacing electrical equipment; selection of the right protective metals and dielectrics, protective painting and plating and air conditioning when equipment is installed indoors. Most common corrosives are acids, alkalies, salts and brines, high temperatures and moisture.

Listed as various ways in which electrical equipment is made unreliable by corrosion were:

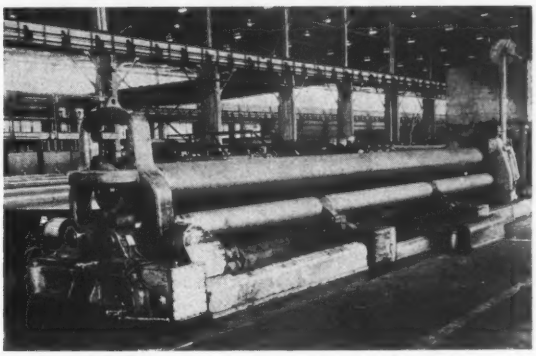
1. Overheating of contacts on starters, fuses, and circuit breakers.
2. Disintegrating of braided or twisted shunts, connecting studs, and terminal screws.
3. Open circuits in fine wires of operating coils on relays and contactors.
4. Sticking of relays, meters, instruments, control buttons, rehostats, solenoids, and controllers.
5. Rusting away of apparatus enclosures, conduits, meter frames, ball bearings, transformer cases and line hardware.
6. Failure of power circuit brakers to trip or close.
7. Grooving and burning of commutators and collector rings.
8. Insulation failures on motor windings and coils of various types.
9. Flashover of porcelain bushings.

Finger Gating Choke Control

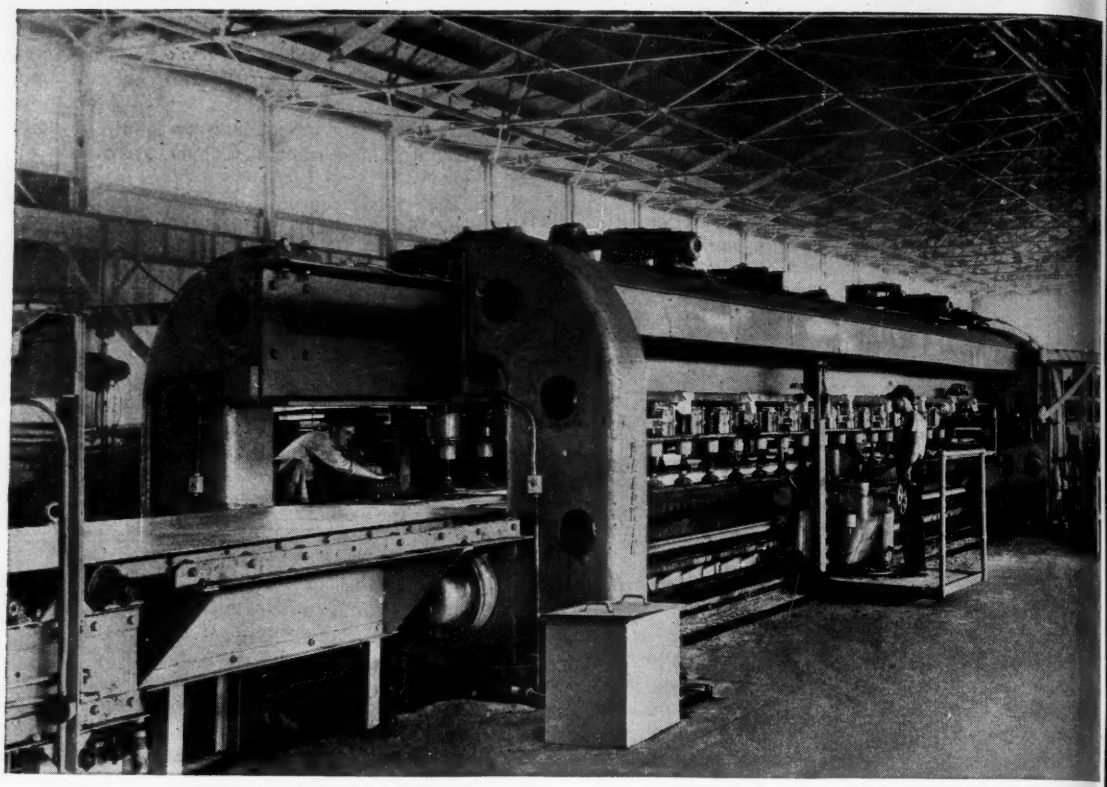
Navy researchers, hunting ways to make better metal castings, photographically "shadowed" molten metal as it flowed through the channels in a mold, and thus learned to arrange the channels so as to produce smooth metal flow—the key to better castings. This was revealed in a Naval Research Laboratory report now available to the public.

Gating systems (connecting pipes that lead metal into the casting mold) have previously been designed on the assumption that metal would flow where open channels existed. The Navy investigation showed that contrary to this assumption, metal flowing freely in a channel may continue along preferential straight-line paths, ignoring side channels and openings. This investigation also showed that producing suitable enlargements at some point in the channels and suitable restrictions at others, would result in uniform metal flow into all mold cavities, producing sound castings.

Making Miles of High Pressure Pipe



MORE THAN 800 miles of 24 and 30-inch outside diameter tubular shape for high pressure welded pipe in 31½-foot lengths was rolled from 78 and 97-inch skelp in the first year of operation for this pyramid type bending roll in a large southern pipe mill. Baldwin-Lima-Hamilton Corp., Philadelphia, designed and built the unit. All three rolls are driven by a 100-hp motor permitting speed up to 60 fpm. High speed up to 30 inches per minute is used to position the 20-inch diameter top roll and low speed up to 12 inches per minute applies increasing bending pressures; a 100-hp motor drives the screw down. Distance between bottom roll centers can be varied from 18 to 24 inches by a motor drive, permitting top roll deflection to be controlled to present a comparatively straight roll surface to the plate and thereby avoiding the barrel effect on the cylinder

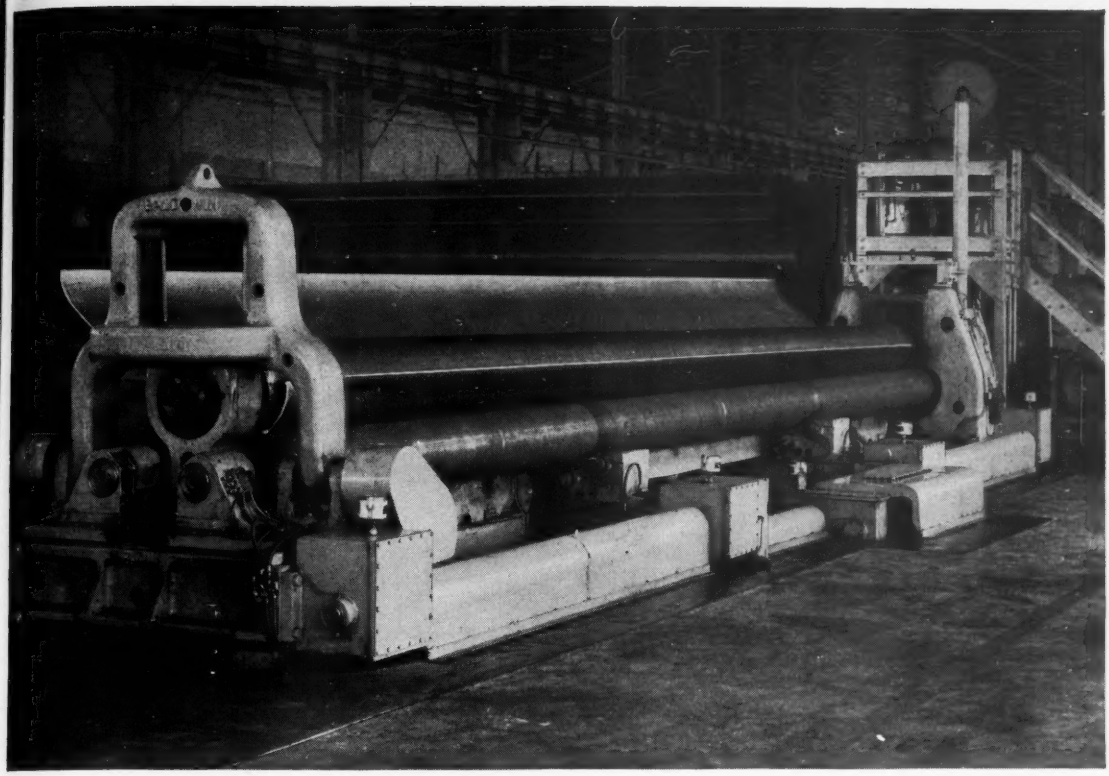


LARGE PIPE & LOTS OF IT with BALDWIN equipment

Spotted at vital points in the production line, Baldwin Plate Planers and Baldwin Bending Rolls are helping five of the nation's largest producers to blaze new trails in applying assembly-line methods to pipe manufacture.

As illustrated above, the Baldwin Plate Planers are arranged in pairs, properly spaced to machine both edges of the skelp simultaneously. Separation can be varied, to accommodate different widths. The material then progresses to a large Baldwin bending roll, where it is converted to cylindrical form ready for welding. Daily production is measured in miles.

Baldwin Plate Planers and Bending Rolls are also serving in the plants of other leading pipe producers. One of their biggest advantages is the fact that they lend themselves perfectly to specialized operations such as these . . . and at any time can be assigned to jobbing operations, where they produce with equal efficiency.



BALDWIN EQUIPMENT OFFERS THESE FEATURES

BALDWIN plate planers

Soundly engineered and precision built, with "custom-built" features including:

- Group Control of all work-clamping cylinders.
- Shielding of carriage screws from dirt, scrap or dropped tools.
- Anti-friction thrust bearings . . . drive design keeps screw in tension during planing.
- Continuous lubrication.
- Allowance for overrun in event of electrical failure.
- Main operating controls within easy operator reach.

Ask for Bulletin 190 for added details.

BALDWIN bending rolls

Designed primarily for heavy duty operation—noted for rugged construction and operating efficiency. Either standard or special units, offering these advanced engineering features:

- All forces and reactions largely absorbed within members in which they originate.
- Cut-steel spur type driving gears, shielded for safety and to protect against dirt.
- Drive bearings cast as an integral part of gear case, assuring alignment accuracy.
- Positive, precise controls—operator has full view of work.

Ask for Bulletin 278 for more information.

BALDWIN-LIMA-HAMILTON CORPORATION
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BALDWIN - LIMA - HAMILTON

Analyzer Controls Gas Cleaning Equipment at Blast Furnaces

Recently developed assembly sounds alarm when flue dust concentration exceeds a predetermined limit or when power failure leads to ineffective operation of cleaning station

BLAST furnace gas is being supervised at an eastern plant by a device developed by General Power Plant Corp., New York, and which provides a continuous record of the dust in the gas and an alarm to advise the operator when the dust concentration is exceeding the allowable limit. The general arrangement of the entire assembly and the principal dimensions are shown in Fig. 1.

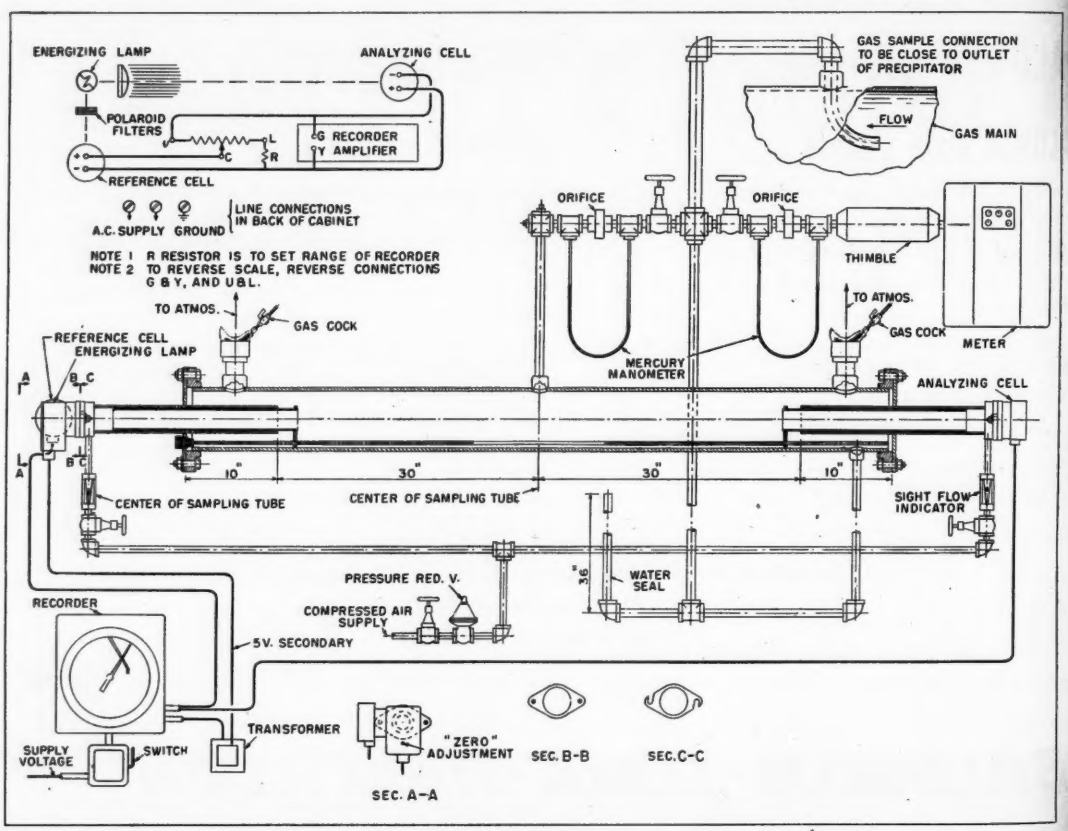
Gas sample is introduced into the center of the main tube of the gas analyzer and flows either way to the exhausts where it is burned. The outlet is large in relation to the inlet to keep the pressure constant in the sampling tube. Use of large exhausts keeps the sampling tube at practically atmospheric pressure.

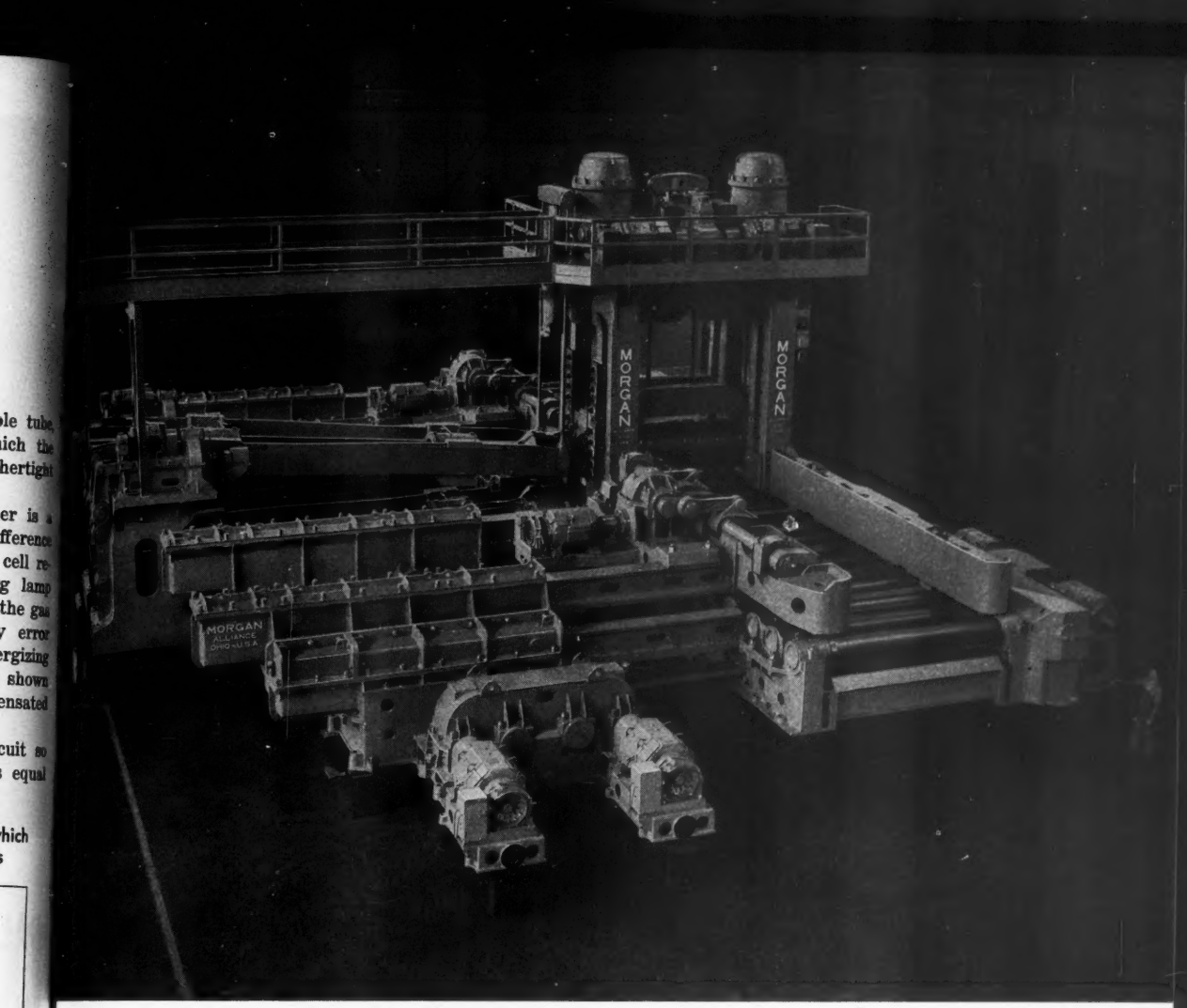
The gas must move fast enough through the sampling tube to keep the dust in suspension and to keep the sample representative of the gas in the main at the time the sample is recorded. The sample tube, therefore, is located near the point at which the sample is removed from the main. Weathertight housings are available for the recorder.

Unaffected by Voltage Variations—Recorder is a special electronic circuit that measures the difference in output between two photronic cells. One cell receives the light directly from the energizing lamp while the other cell receives its light through the gas being analyzed. This circuit eliminates any error caused by line voltage variations on the energizing lamp. A schematic diagram of this circuit is shown in Fig. 1. The recorder circuit also is compensated for variations in line voltage.

Instrument is zeroed by adjusting the circuit so that the output of the two photronic cells is equal

Fig. 1—General arrangement of instrument which records amount of dust in blast furnace gas





44" TWIN MOTOR DRIVE BLOOMING MILL

Morgan 44″—2 High Reversing Blooming Mill to be direct connected to two 4000-Hp., 50/120 Rpm. Motors. Top roll and both spindles are hydraulically balanced by individual cylinders connected to an air hydraulic system. Speeds of motor driven screw down, feed rollers, mill tables and manipulator are regulated by variable voltage control.

Mill tables have box type cast steel girders. Rollers are forged steel equipped with anti-friction type bearing cartridges. All gears have hardened teeth, are totally enclosed and operate in oil. Manipulator is of the electric overhead type with retractable heads affording maximum accessibility to all parts of the mill tables.

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BRIDGEPORT BRASS COMPANY

COPPER ALLOY BULLETIN

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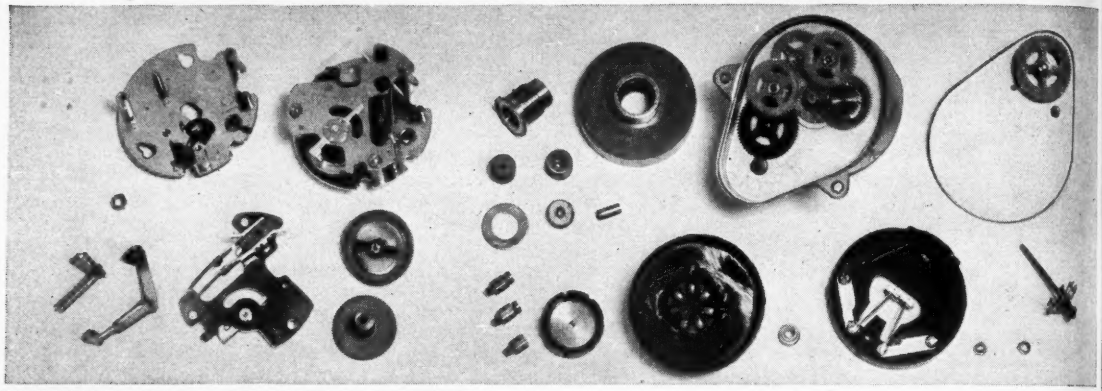
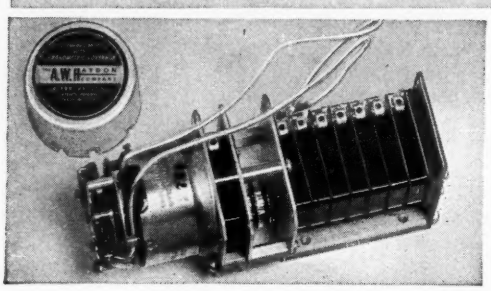




Upper left shows mechanism of governor for timing motor. Parts in center are for motor. Gear Box, cover plate, brush plate and commutator are shown at right.

Lower left is timing motor with cover removed from governor assembled in repeat cycle switch assembly—Courtesy The A. W. Haydon Co., Waterbury, Conn.

Clock Escapement Accurately Governs D.C. Timing Motor

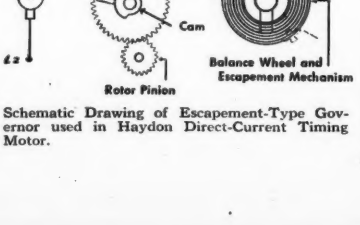
The ordinary clock escapement mechanism is proving an effective governor in controlling the speed of direct-current timing motors for military and civilian timing applications. Fluctuations in voltage, load and temperature which would affect the speed of the motor are cancelled out by the governor.

The unit is used for de-icing airplane propellers and wings, electronic devices, recorders and other precision timing units.

The accuracy of this device, manufactured by the A. W. Haydon Company, Waterbury, Connecticut, is seen in an aircraft application where the drive shaft speed is 1 revolution per minute accurate to plus/minus 0.1%.

The timing motor is geared directly to a cam which oscillates the motor lever, causing the control contacts to separate, thus opening the motor circuit. When the balance wheel returns from its free swing, it releases the escapement lever and allows the control contacts to close, applying full voltage.

Thus pulses of full line voltage are applied to the motor at regular intervals controlled by the escapement. The duration of these pulses is determined by the travel of the motor. This results in a uniform travel of the motor during each swing of the balance wheel. A constant motor speed is thereby obtained. The unit always stops with contacts closed, insuring self-starting.



Schematic Drawing of Escapement-Type Governor used in Haydon Direct-Current Timing Motor.

In the governor the two plates, motor lever, balance wheel and escapement lever are made from clock brass (62.25% copper, 2% lead and balance zinc). The lead increases the machinability and facilitates clean blanking and piercing with a minimum of burr.

Where extreme accuracy is not needed, instead of using jewels for the various bearings in the governor, the leaded brass serves as an excellent bearing surface.

The hair spring is a special alloy which has a negligible expansion and contraction factor from −50 deg. to +150 deg. F. It is therefore unnecessary to compensate for varying temperatures.

Through a gear train either the 900 RPM or 2700 RPM rotor speed of the motor can be geared down to 1 revolution in two hours. The gear box is so designed that speeds can be changed through a wide range by various standard combinations of gears.

The clock brass gears and pinions are hobbed to insure accurate meshing.

The drive shaft bearing in the gear box is commercial bronze (90% copper and 10% zinc).

The commutator sections in the rotor are made from oxygen-free copper since high conductivity is needed.

The rotor bearing is free-machining brass rod and the part is produced in a screw machine. This alloy contains 61% copper, 3.4% lead and the remainder zinc, and it has the highest machinability rating of all the copper-base alloys. (6832)

CAUSES OF CORROSION

This article is one of a series of discussions by C. L. Bulow, corrosion metallurgist of the Bridgeport Brass Company.

DEZINCIFICATION CORROSION (Cont'd)

Copper Salts Necessary for Dezincification

R. B. Abrams[1] pointed out in 1922 that a relatively high concentration of copper ions is an important prerequisite to dezincification of brass. Since that time numerous investigators have used aqueous solutions of copper salts, particularly cupric chloride in studying: 1. the mechanism of dezincification, and 2. the effectiveness of various methods of inhibiting dezincification.

Arsenic Prevents Deposition Of Copper

In 1924 G. D. Bengough and R. May[2] described an experiment which showed that arsenic trioxide was an effective inhibitor of copper deposition on 70/30 brass in cupric chloride solution. They found that arsenic was effective in preventing the deposition of copper when the ratio of the concentration of arsenic to copper in the solution was greater than one.

Additional Elements Prevent Dezincification

They wrote that "In view of the remarkable effect of arsenic in influencing the nature of the corrosion products of brass, and through them the corrosion rate of the alloy itself, it was decided to examine the influence of a number of metals which commonly occur in brass, either as accidental or intentional additions."

In the same paper, they reported the results of tests conducted on 70/30 brass modified by additions of: 1% tin, 0.5-1.0% nickel, 0.5-2.0% aluminum, 0.5% tungsten, 0.04-2.0% manganese, 0.48-0.91% iron and 0.01-.04 arsenic. These elements were found to prevent dezincification in the following order: arsenic, tin, nickel, tungsten, and aluminum. Both manganese and iron increased the rate of dezincification under their test conditions.

Even A Trace Of Arsenic Is Effective

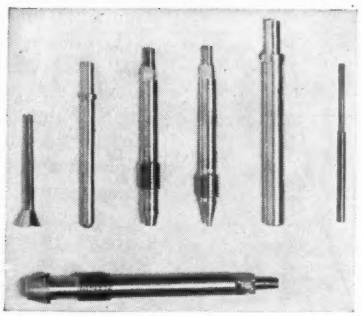
This work showed that otherwise pure 70/30 brass containing as little as .02% arsenic would not dezincify "in any conditions likely to occur in sea water up to a temperature of at least 50°C and that even 0.01% arsenic may be effective." During the same period C. F. Nixon[3] reported that brass containing less than 0.3% of arsenic was remarkably resistant to dezincification.

(1) R. B. Abrams, Trans. Amer. Electrochem. Soc. 42, 39-54 (1922)

(2) G. D. Bengough and R. May, Journal Institute of Metals 32, 2, 81-256 (1924)

(3) C. F. Nixon, Trans. Am. Electrochem. Soc. 45, 297-310 (1925)

Successful Turning Of Long Parts



Larger pieces are valve stems which have been turned with box tools. The very thin, long piece was turned with a carbide V-block support — Courtesy Waterbury Screw Machine Products Company, Waterbury, Conn.

There are several methods of turning long diameters in screw machine work on copper-base alloys. 1) Box tools with rollers or V-blocks. 2) Box tools with spring-loaded floating center. 3) Swing tools with bushings. 4) Diametrically-opposed tools — one set slightly ahead of the other. 5) Skiving.

On exceptionally long parts, carbide tools are advisable, despite their higher initial cost, because they reduce need for frequent sharpening.

Cutting tool clearances must be sufficient to avoid burnishing action which increases pressure on the work. This may result in a tapered cut or bending. Normally low feeds with high speeds are most successful.

The stock temper of free turning brass rod is generally sufficient in sizes above ⅜". In smaller diameters, or if the turned surface is exceptionally long, a higher temper is advisable. The Bridgeport laboratory will be glad to help select the proper alloy and temper for the job at hand.

NEW DEVELOPMENTS

This column lists items manufactured or developed by many different sources. None of these items has been tested or is endorsed by the Bridgeport Brass Company. We will gladly refer readers to the manufacturer or other sources for further information.

Automatic Tacker quickly staples braided, rubber-coated, single and double strand wire, and hollow tube lines. The small portable device uses a staple that easily penetrates plaster, composition board, hard and soft woods. **No. 1162**

Cathodic Etcher is reportedly suitable for research and production sampling of metals. The glow discharge which "etches" the metal surface is produced by positive ions passing between an aluminum anode and the sample. The grain boundaries are attacked at a different rate than the main bodies of the crystals. This brings out crystal shapes and other characteristics clearly. **No. 1163**

Drawn Shell Trimming Machine can be used for flat-edge trimming, forming, offsetting, beveling, beading, serrating, stenciling and similar operations. The machine, which will work on up to 13-gage sheet, is equipped with a 3 hp, 1750 rpm motor and requires 20 to 80 psi. **No. 1164**

Portable Tube Bender handles brass, copper, steel and other light gage tubing in ⅜, ½ and ⅝ in. diameters, forming bends and offsets of up to 180°. **No. 1165**

Air Powered Hydraulic Drilling Unit is suitable for production drilling, reaming, tapping, centering, chamfering and spot facing. Depth of final hole is said to be controllable within .0005 in. Provision can be made to feed on back stroke for tapping, threading and back spot facing. **No. 1166**

Bench-Model Wet-Blaster uses fine abrasive suspended in water carrier which is forced against metal parts through a siphon jet gun. Device is said to remove all foreign substance from metal surfaces and provide a clean base for plating and painting. In operation, parts are inserted through front window door. All controls are located on the side of the cabinet. **No. 1167**

Milling Attachment clamps on ways of 9" bench lathe and is driven by lathe spindle through V-belt and adjustable pulleys. Maximum longitudinal feed is 8", cross feed is 4". Downfeed, graduated in thousandths, has 3¼" vertical travel. **No. 1168**

Portable Hardness Tester measures Shore hardness by the rebound of a falling hammer after striking test surface. Conversion tables are furnished for Rockwell "B" and "C" scales as well as for Brinell readings. In operation, the hammer strikes the work, rebounds and remains at the peak of the bounce, held by a magnetic clutch. A mark on the hammer acts as pointer on the scale to provide hardness readings. Unit measures 1½ x ½ x 8¾ in., weighs about 8 oz. **No. 1169**

Rotating Drum Separating Machine recovers metals from waste materials. Slag, dross, sweepings and similar waste are fed into hopper and pass into a revolving drum, where steel balls grind the material to metal shot and dust. A cylindrical screen separates the shot from the dust, and the recovered metal conveyed to the charging hopper. Two sizes are available, rated at 350 and 1,000 lbs. an hour. **No. 1170**

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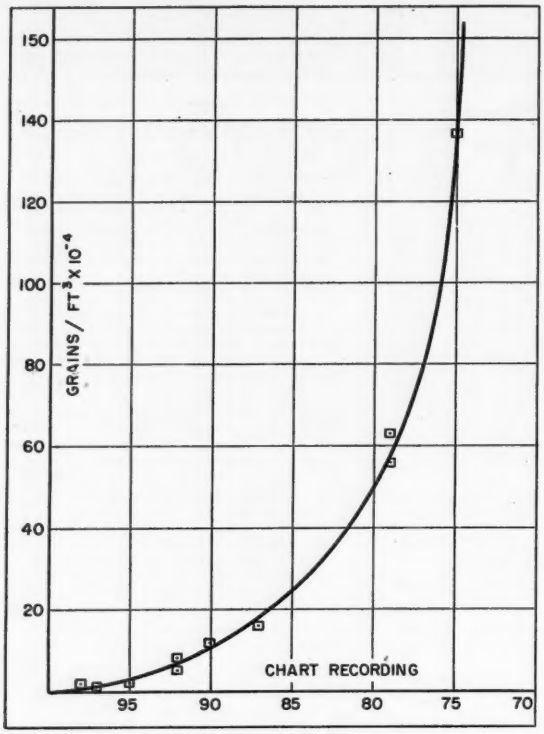


Fig. 2—Calibration curve plotted from weight of solids and average chart reading

when the sampling tube is filled with clean air. The equipment is designed so that the columnated light reaching the analyzing cell is greater than that at the reference cell when the lamp is at the focal point of the lens. The two cells are brought into balance by moving the lamp ahead of the focus point, thereby scattering the light on the analyzing cell. This is accomplished by an adjusting screw accessible through the back of the energizing lamp case. In this way the instrument can be compensated for any dust that might have collected on the lenses. Several months' operation indicates that this adjustment is not required after a week of continuous operation.

The 20 inches of 2½-inch tube in front of the lamp and cell provide a dead air zone to keep the gas away from the lenses. A small quantity of dry air can be introduced near the lamp and cell to keep the gas from entering this tube. This air doubles back along the outside of this tube to the outlet without changing the length of the sample between the ends of these 2½-inch tubes.

Sensitivity Adjustments—To measure dirty gas it is necessary to reduce the length of the sample to keep the reading on the chart. This is accomplished by sliding the inside sleeve (a 2⅜-inch tube) out of the 2½-inch lamp and cell support tube (see Fig. 1). In this way the length of the sample can be reduced from 60 to 20 inches. The sensitivity of the recorder can be increased by adding resistance "R" to the "L" end of the slide wire in the recorder thus increasing the pen travel per unit of dust in the sample.

Recorder necessarily must be calibrated for each type of gas and for each setting of the sampling tube, i.e. the width of the sample. The width of the sample is altered depending on the average density of the gas to make the pen record nearer the outer edge of the chart. For relatively clean gas this width is 60 inches—for dirty gas it may be reduced to a minimum of 20 inches.

Calibration is accomplished by measuring the actual solid content of the gas, using the familiar thimble and weighing the content. The start and finish of this test is noted on the recorder chart with the number of the thimble. The actual weight of solids then is compared to the average chart reading. These results are plotted on a graph—chart readings vs weight of solids and a smooth curve drawn through the points. A typical calibration curve is shown in Fig. 2. In this case, the width of the sample was 60 inches. It will be noted that this sample width is suitable for densities up to 0.012-grain per cubic foot of gas at atmospheric pressure.

Translating the Chart—The typical chart shown in Fig. 3 indicates trouble with the gas cleaning equipment. From 5 a.m. when the chart was changed until 10 a.m. when the condition was partially corrected the cleaning eqiupment was not removing sufficient dust from the gas. At 11 a.m. the condition was rectified and continued good until 2:30 p.m. when further trouble developed. The deep break at 11:45 a.m. was caused by temporary power failure to the gas cleaning station.

Sight flow indicators can be used in the clean air line but not in the gas sampling line since they soon are too dirty to read. A monometer reading the pressure loss through an orifice is a satisfactory indicator.

System Components—Analyzing tube can be designed for high-pressure gas to meet special requirements. The standard unit consists of a standard

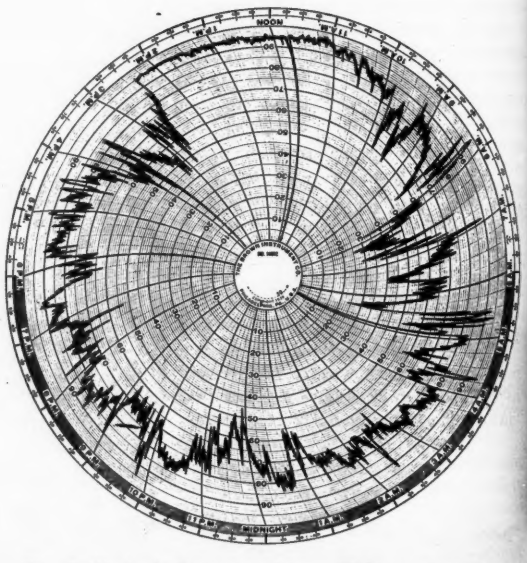
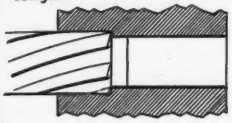


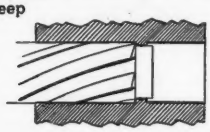
Fig. 3—Typical chart covering a 24-hour operation of blast furnace gas cleaning equipment

THE OLD WAY

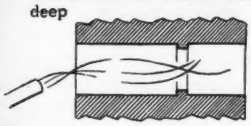
1. Drill 25.5 m.m. (1.004") hole full length



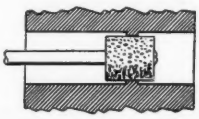
2. Machine bore to 1.761", .9975" deep



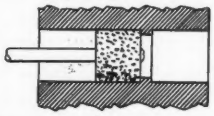
3. Rechuck and machine opposite end of bore to 1.761", 1.9355" deep



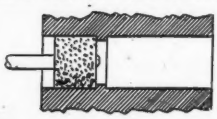
4. Heat treat and quench



5. Grind .00355" off shoulder inside diameter



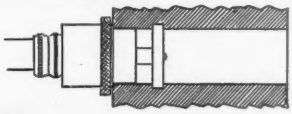
6. Grind .0025" off bore, one end and 0025" off side of shoulder



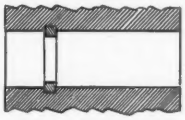
7. Rechuck and grind .0025" off bore, opposite end and .0025" off side of shoulder

RELIANCE WAY

1. *Drill 1.811" (30 M.M.) hole, full length



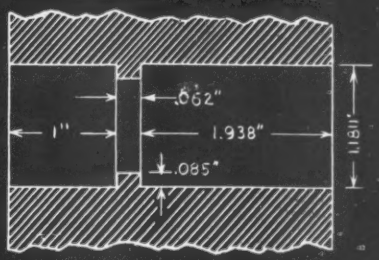
2. Recess groove .074" wide and .040" deep in bore, 1" from end



3. Snap Reliance Ring in groove

* For some applications, seamless tubing may be used, eliminating all drilling

No heat treating is normally required as ring is already hardened. No danger of warpage. If bore must be hardened, it may be ground in one pass after heat treating.



HOW RELIANCE RINGS

(AND GROOVING TOOL)

Slash the Cost of internal shoulders

The drawing and comparison chart above show how Reliance Rings and the Reliance Grooving Tool slashed the cost of internal shoulders on a typical application, eliminating four operations — savin gtime and money.

Reliance Snap Rings are available in carbon, alloy, stainless steel or non-ferrous metal to specified physicals, cross sections and diameters—ends shaped to meet any requirement. Reliance Rings offer opportunities for cost reduction, time saving and product improvement limited only by human ingenuity in finding new uses for them.

Reliance engineers will be pleased to study your prints or parts and lend the benefit of their experience in considering possible application of Reliance Rings to your product. Or, if you prefer, a competent representative will call to discuss the possibilities with you. Write, phone or wire your nearest Reliance Sales Office

EATON

TON MANUFACTURING COMPANY

RELIANCE RINGS

RELIANCE DIVISION, MASSILLON, OHIO

Sales Offices: New York, Cleveland, Detroit, Chicago, St. Louis, San Francisco, Montreal

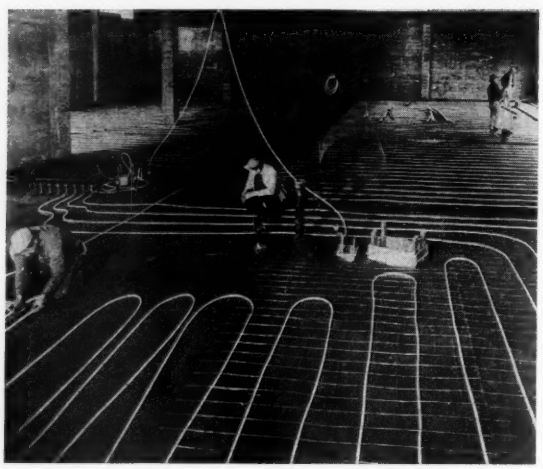
weight 6-inch steel pipe, 80 inches long, with 125-pound flanges on each end. A 1-inch pipe coupling is welded to the center generally on the top for the gas sampling line and a similar coupling on the bottom at one end is provided for a drain to the water seal or trap depending on the gas pressure in the analyzer. Two additional couplings, one at each end, are provided for the exhaust. The size and location of these connections may vary depending on the gas being analyzed.

Lamp and cell support pipe is a 2½-inch standard weight steel pipe, 21 inches long threaded on one end for the lamp and cell flange. A steel flange is welded at the approximate center. This flange is drilled for bolts to match the 125-pound flanges on the 6-inch analyzing tube. A gasket is used to make this joint gas-tight.

Threads must be machine cut to be sure the flange faces are 90 degrees to the centerline of the tube within good commercial tolerances. The same accuracy in mounting the steel flanges on the 2½-inch lamp and cell support tubes is required. This support pipe has a ½-inch pipe coupling welded to the outer end for the air connection. The entire sampling tube with the energizing lamp and cells weighs approximately 200 pounds.

Plastic Tubing for Radiant Heat

Plastic tubing is being used for a radiant panel floor heating system in a new industrial plant in Portland, Oreg. The installation, made for the Pump, Pipe, & Power Co., includes the use of ¾-inch plastic tubing supplied by Carlon Products Corp., Cleveland. The material was chosen because of its resistance to rot, rust and electrolytic corrosion; ease of installation;



low frictional loss and the long lengths in which it is available. In new buildings, the tubing is first laid on rough flooring and held in position with hooks while return bends are made. Wire mesh then is placed over the tubing, and mesh and tubing tied together at 2-foot intervals with binder twine. Hooks are removed after tubing is secured, and entire system is filled with water to eliminate air in the line. Pressure is maintained on system to prevent collapse of the tubing while 2½ inches of concrete is poured. For conversion of existing structures tubing is laid over the old floor surfaces.

Corrosive Material Is No Problem

A finished surface of porcelain enamel has been found an ideal substitute for the noncorrosive metals such as stainless steel in the synthetic rubber processing of the B. F. Goodrich Chemical Co., at their Port Neches, Tex., plant. The part reported is a stripping column tray used in series in a distillation tower where styrene is removed from synthetic latex.

In the manufacture of synthetic latex, styrene is one of two monomers which react together to form the latex. All of the styrene charged is not converted into rubber so it is necessary to recover the unreacted styrene from the latex. This is accomplished by pumping the latex to the top of a distillation tower where it passes down over a series of 12 perforated porcelain enameled trays and is stripped of its unreacted styrene content by exposure to steam.

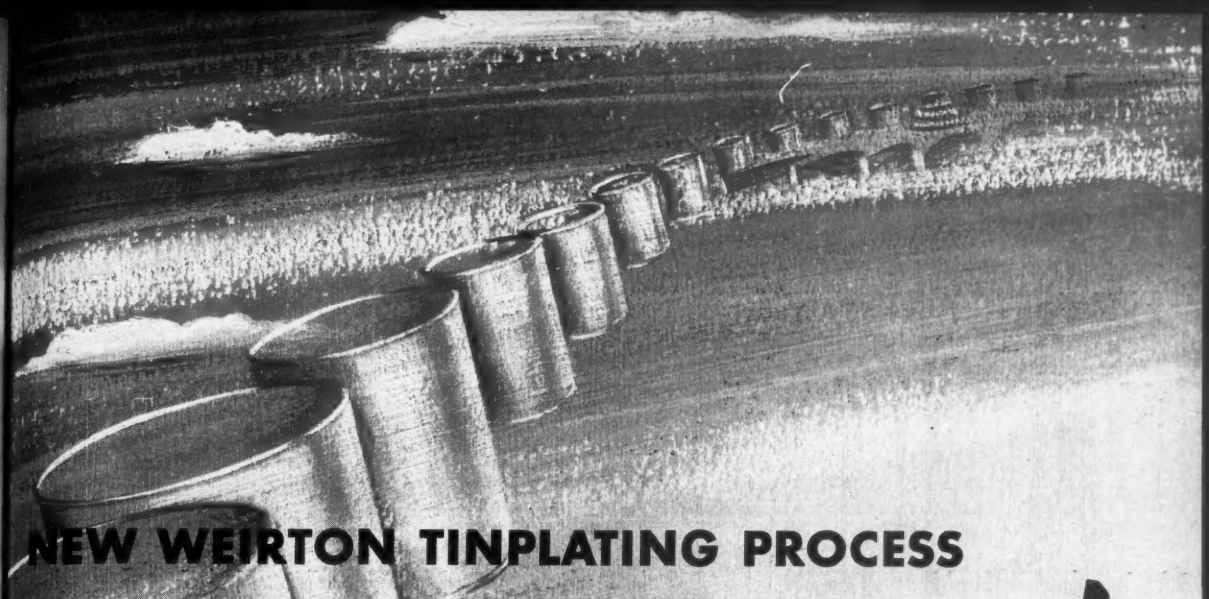
The latex forms a thin coating on the trays which progressively builds up until the perforations are clogged which necessitates cleaning. The company reports that due to the glass-smooth surface of porcelain enamel the latex does not adhere and is removed with an absolute minimum of labor. J. E. Miller, plant manager, states that "in this corrosive service we have found porcelain enamel to be a worthy substitute for polished noncorrosive metals."

Stripping column trays are reported by the supplier, Erie Enameling Co., to be made of 3/16-inch Armco ingot iron and coated on all surfaces with a 0.010-inch thickness of industrial type porcelain enamel. R. W. Brownfield of Erie Enameling states that porcelain enamel is a successful substitute for noncorrosive metals because of inherent characteristics that closely parallel those of the metals.

Porcelain enamel, he explains, is actually a form of boro-silicate glass and is just as inert as glass in the presence of corrosive substances. For the same reason it offers a low coefficient of friction which offers minimum adherence to plastic materials such as latex and a degree of hardness that will resist more abrasion than most steels. Where temperature or thermal shock is a factor, porcelain enamel also offers excellent performance characteristics, Mr. Brownfield states.

In its manufacture, porcelain enamel is bonded to its metal base at temperatures up to 1600°F which assures its satisfactory performance at temperatures up to this limit. Also, the cooling process following the high temperature firing provides a type of annealing action which controls internal stresses, and because the coefficients of expansion of the enamel and metal base are identical, porcelain enameled metals will withstand extreme and rapid changes in temperature.

According to the enameling firm, porcelain enamel is appearing in an increasing number of industrial applications including refinery bubble caps, conveyor tubing bends, conveyor buckets, etc.



NEW WEIRTON TINPLATING PROCESS

Saves 25% to 50% tin!

RELEASES CRITICAL METAL FOR MILITARY USES

An entirely new and revolutionary electro-tinplating process recently perfected by Weirton Steel Company results in new savings in tin amounting to as much as 50 per cent over previous quantities used.

Individual sheets of steel destined for tin can fabrication are plated on one side with an amount of tin necessary to protect the ultimate contents of the can, and on the other side with only the amount of tin necessary to protect the outside of the can from exposure. A new data sheet reveals the immensity of the savings in this critical metal.

Weirton's new development can well prove to be a two-edged sword in national defense; it will not only result in tremendous savings of pig tin for military purposes but will at the same time increase the production of tinplate for vital food packing and container industries.

NEW ELECTROLYTIC TIN COATING DATA SHEET OF WEIRTON STEEL COMPANY

.25# Basis One Side .50# Basis Reverse Side	In Lieu of .50# Basis Both Sides
Average Coating	.375#
Metal Savings Per Base Box	.125#
Metal Savings—Per Cent	25.0%
Increase in Area	33.3%

.25# Basis One Side 1.00# Basis Reverse Side	In Lieu of 1.25# Basis Both Sides
Average Coating	.625#
Metal Savings Per Base Box	.625#
Metal Savings—Per Cent	50.0%
Increase in Area	100.0%

.50# Basis One Side 1.00# Basis Reverse Side	In Lieu of 1.25# Basis Both Sides
Average Coating	.750#
Metal Savings Per Base Box	.500#
Metal Savings—Per Cent	40.0%
Increase in Area	66.7%

.25# Basis One Side .75# Basis Reverse Side	In Lieu of .75# Basis Both Sides
Average Coating	.500#
Metal Savings Per Base Box	.250#
Metal Savings—Per Cent	33.3%
Increase in Area	50.0%

.375# Basis One Side 1.00# Basis Reverse Side	In Lieu of 1.25# Basis Both Sides
Average Coating	.6875#
Metal Savings Per Base Box	.5625#
Metal Savings—Per Cent	45.0%
Increase in Area	81.8%

.50# Basis One Side .75# Basis Reverse Side	In Lieu of .75# Base Both Sides
Average Coating	.625#
Metal Savings Per Base Box	.125#
Metal Savings—Per Cent	16.7%
Increase in Area	20.0%

WEIRTON STEEL COMPANY

WEIRTON, WEST VIRGINIA

NATIONAL STEEL CORPORATION

WEIRTON STEEL COMPANY

Electric Furnace Design Meets Production Needs

ELECTRIC furnace manufacturers have been forced to design equipment so that variable electrode spacing can be obtained with a minimum shutdown for changeover. In discussing the future design of ferro-alloy furnaces at a recent symposium sponsored by the Niagara Falls section, Electrochemical Society, H. S. Newhall, manager, Electrothermic Div., Pittsburgh Lectromelt Furnace Corp., stated that it was generally felt that the electrodes should be placed as close together as physically possible. However, he pointed out that there are some operations, such as producing ferro-manganese that require wider spacing. Hence the need for variable spacing.

Another development pointed out by Newhall is the knuckle or slip joint which will eliminate flexible cables and reduce maintenance to a minimum. One problem faced by the ferro-alloy industry is the shutdown time due to the slipping of electrodes. According to Newhall, a power operated clamp is a must for the future. This type of clamp has been designed and is in operation for the steel furnaces and on the self-baking electrode type furnace.

Fume Control Hoods—Newhall predicted that the future furnaces will have hoods for fume control. He pointed out that in most cases the ferro-alloy companies have no use for the gases. Also, it is cheaper, generally, in the U. S. to buy gas than to clean the furnace gases. It is conducive to better operation to be able to work the furnace under a hood rather than to have to control the furnace completely by materials.

With a hooded furnace, a floor can be placed directly above the hood with the electrode extending up through the floor, thus allowing new sections of electrodes to be added under power where the operator can be insulated from short circuit. A great deal of consideration is being given to the hydraulic control operated system; this system is actually being used in some furnaces. Newhall also predicted that in the future the larger furnaces, in general, will use six carbon electrodes or large graphite electrodes rather than go to self-baking electrode gears.

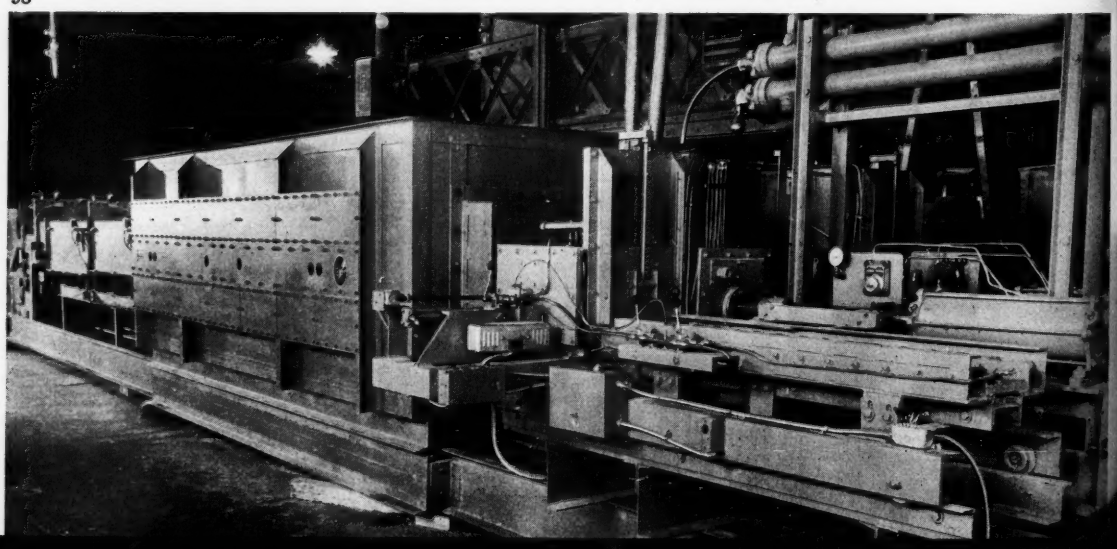
Furnaces for Continuous Processes—R. L. Harper, Harper Electric Furnace Corp., brought out the fact that furnace design for metalworking processes has advanced from manually operated, pusher-type furnaces to large, continuous production-type units. Furnaces for making metal parts by the powder metal process are becoming more numerous. According to Harper, the aviation industry has found that they can obtain a less expensive and stronger product by making certain alloy engine parts by the powder metal process.

Large tonnages of these small parts are made in furnaces like the one shown in the accompanying illustration, where the materials are pushed through twin muffles placed in parallel through the furnace. The advancing, charging and discharging of the product through these furnaces is completely automatic. The furnaces are heated with Globar nonmetallic heating elements. Maximum operating temperature is 2100° F. These furnaces are also used for making porous bearings from bronze and brass powders as well as in the production of many intricate parts from ferrous metal powders.

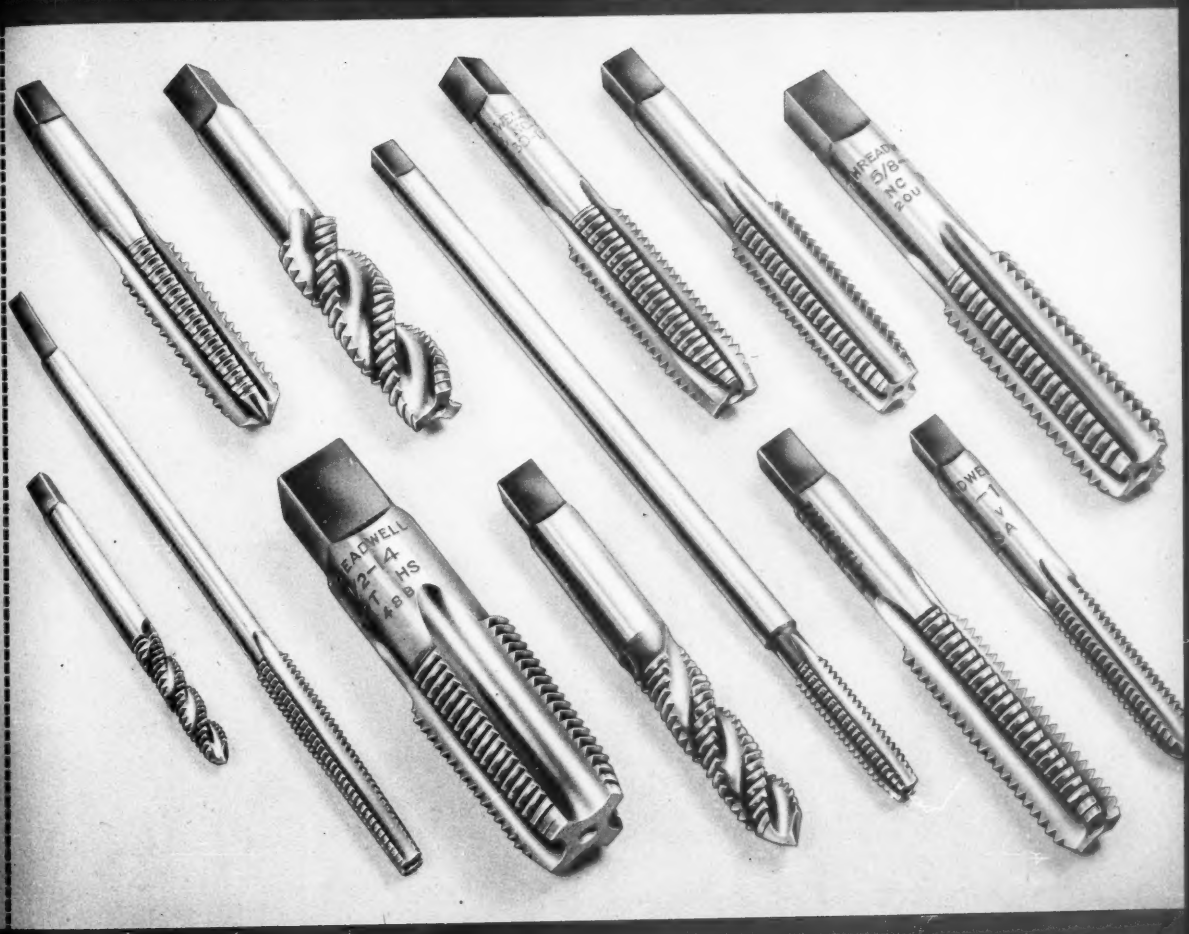
Moly Heating Elements—Resistance furnaces heated with molybdenum heating elements operating at a temperature range from 2300 to 2750° F are used in making tungsten carbide tool tips by cementing the carbide powder with cobalt in a hydrogen atmosphere. The radio, radar, and television industries require large quantities of components produced in a continuous tunnel kiln type of resistance furnace.

Another product required by the radio and television industry is magnetic cores needed for the manufacture of transformers. These cores are made from ferrite, which is a product made from a mixture of iron oxide, nickel oxide and zinc oxide with various substitutions to obtain different electrical characteristics. Cores are fired in continuous production type tunnel kilns of the same general design as those used for titanates.

Powder metal parts are sintered in electric furnaces like this where the materials are pushed through twin alloy muffles placed in parallel through the furnace. The advancing, charging and discharging of the product is completely automatic. Courtesy Harper Electric Furnace Co.



Threadwell TAPS

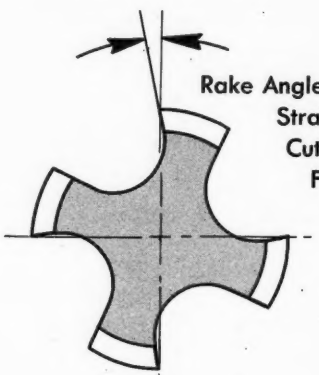


THREADWELL TAP & DIE CO. Greenfield, Mass., U. S. A.

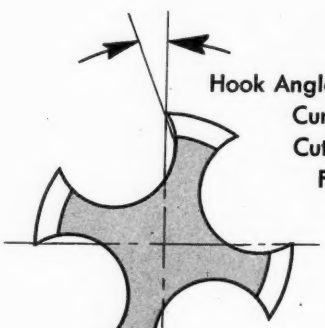
CUTTING FACE ANGLES
for Tapping Various Materials

MATERIAL	SUGGESTED RAKE OR HOOK
Allegheny Metal	12° Rake
Aluminum	10° Hook
Bakelite	3° Rake
Brass: Soft	2° – 3° Rake
Hard	5° Rake
Red 85-5-5-5	5° Rake
Bronze: Manganese	2° – 3° Rake
Phosphor	2° – 3° Rake
Tobin	8° Rake
Copper	20° Hook
Die Cast Aluminum	10° Hook
Duralumin	10° Hook
Fiber	3° Rake
Iron: Cast	0° – 3° Rake
Malleable	3° – 5° Rake
Magnesium	20° Rake – 4° Heel Rake
Monel Metal	12° Hook
Nickel Silver	20° Hook
Rubber	15° Hook
Steel: Cast	15° Rake
Chromium	10° Rake
Machinery	5° Rake
Manganese	10° Rake
Molybdenum	10° Rake
Nickel	8° – 10° Rake
Stainless	12° Rake
Tool	5° Rake
Tungsten	10° Rake
Vanadium	10° Rake

A Hook or Rake Angle is the angle formed between the vertical axis of the tap and a line intersecting the major and root diameters of the thread.



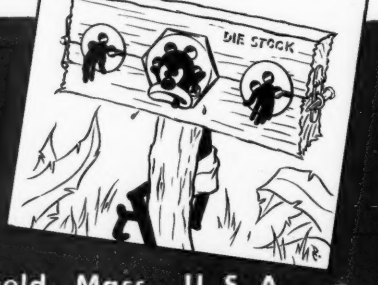
Rake Angle — Straight Cutting Face



Hook Angle — Curved Cutting Face

Threadwell

Threadwell Tools do many jobs



they can do your tough ones

THREADWELL TAP & DIE CO. Greenfield, Mass., U. S. A.

Turbine Blade Materials

(*Continued from Page 75*)

tion of results with actual service conditions is difficult. This is particularly true in the case of gas turbines, since an overhaul must be made at the time the first blade fails in service, while the life of the engine is measured by the time required for the "average" blade to fail.

Co-operate on Fatigue Studies — A recent Research Memorandum (51A04)[2] of the NACA reported at length the preliminary findings of a co-operative investigation of the relationship between static and fatigue properties of low-carbon N-155 (20-20-20 chrome-nickel-cobalt and 32 per cent iron) alloy bar stock at elevated temperatures. Participating agencies, along with the Lewis Laboratory, were the Elliott Co., General Motors Research Laboratories, University of Michigan, Battelle Memorial Institute, Rolls-Royce Co., Westinghouse Electric Corp., Syracuse University and the U. S. Naval Engineering Experiment Station.

Their objective was to develop curves relating alternating stress to mean stress for fracture in 50, 150 and 500 hours at 1000, 1200, 1350 and 1500°F. Arrangements were made to obtain data under various combinations of static and dynamic stress ranging from the static rupture test to the completely reversed stress fatigue test. Special effort was made to include representative types of fatigue machines, and particular care was exercised to provide test specimens from uniform material and with uniform surface finish regardless of the shape of the test specimen. Bars were solution treated for 1 hour at 2200°F, water quenched and then aged for 16 hours at 1400°F. The particular material was selected because it had the most uniform properties at high temperatures of any representative super-alloy known; second, because it was metallurgically similar to several forged alloys of the type applicable to gas turbines, and finally because there was more metallurgical background available for this alloy than for any other.

An accompanying table summarizes results of tensile and fatigue tests made in the various laboratories at the four elevated temperatures and three periods of time. Agreement in results is considered by NACA analysts to be surprisingly close. In all cases the deviation between the various types of tests was less than could be accounted for by experimental error. As far as can be deduced from the data, surface finish effects were constant, and it was questioned whether the elaborate precautions taken to insure uniform surface finish were necessary. However, this is not taken to prove that surface finish variations cannot influence results of tests at high temperatures. It simply means that the effect of surface finish variations at high temperatures has not yet been established.

Investigate Aging Effects—It has been reasoned logically that conservation of critical alloys might be furthered by the discovery of some proved heat treatment method which would prolong the life of the "average" turbine blade from, say, 50 to 500 hours. This tenfold improvement would mean on an average ten times longer service life for the gas turbine engine, since blade life is the key to engine life. A number of laboratory projects have been initiated in the field of heat treatment to probe the possibilities. For example, NACA Technical Note 2320[3] reports the favorable effects of some solution treatments at temperatures of 2350, 2250 and 2100°F followed by aging at 1500°F on the life of small cast cobalt-chromium AMS 5385 blades. The blades were operated in a small gas turbine. Temperature and centrifugal stress at the midspan of the blade airfoil were 1500°F and 20,000 psi, respectively.

Results of the investigation indicated that the mean life was improved and time to initial failure was lengthened by the heat treatments. The results were confirmed by a statistical analysis. It was also indicated that some of the heat treatments resulted in improved uniformity.

In another investigation[4] the effects of a 48-hour aging treatment at 1500°F on the life of 20 small cast vitallium blades operated at 1500°F and stress of 20,000 psi at the blade failure plane were measured against 33 unaged blades. Vitallium analysis was 25-29 per cent chromium, 5-6 molybdenum, 2 iron, 1.75-3.75 nickel, 1 maximum manganese, 1 maximum sulphur, 0.20-0.35 carbon and the balance cobalt. Aging apparently improved the time for initial blade failure, average life and the uniformity of life of the blades tested. Statistical analysis of the blade-life data, however, did not indicate a significant improvement in mean life or uniformity of life of the blades, a fact which does not prove that aging is without beneficial effects, but rather indicates that further investigation is desirable for more conclusive results.

Two Lifts Handle Job with Ease

SWINGING a 41-foot long electric furnace from a special railroad flatcar and placing it at a door of Consolidated Vultee Aircraft Corp.'s plant in San Diego, Calif., was an easy job for two Lorain Moto-Cranes made by Thew Shovel Co., Lorain, O. The $29,000 furnace was supplied by Industrial Oven & Equipment Co., Los Angeles, as part of Convair's $1 million outlay for machine tools and other production equipment. It will be used for age hardening aluminum alloys and curing of Metalbonded assemblies

REFERENCES

1 "Initial Investigation of Carbide-Type Ceramal of 80 Per Cent Titanium Carbide Plus 20 Per Cent Cobalt for Use as Gas Turbine Blade Material," by Charles A. Hoffman, G. Mervin Ault and James J. Gangler, Lewis Flight Propulsion Laboratory, National Advisory Committee for Aeronautics, Cleveland; Technical Note 1836, March, 1949.

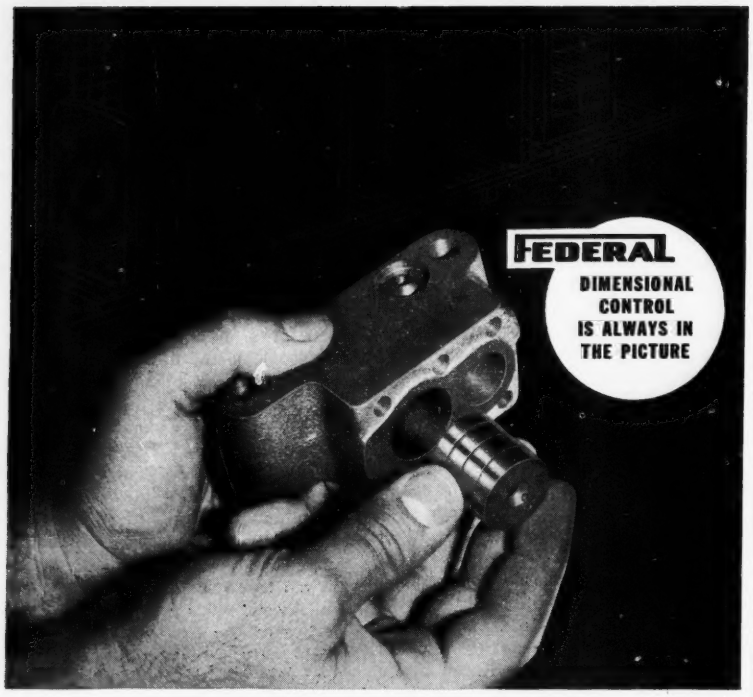
2 "Co-Operative Investigation of Relationship Between Static and Fatigue Properties of Heat-Resistant Alloys at Elevated Temperatures," by NACA Subcommittee on Heat-Resisting Materials, Washington; Research Memorandum 51A04, March, 1951.

3 "Effects of Some Solution Treatments Followed by an Aging Treatment on the Life of Small Cast Gas Turbine Blades of a Cobalt-Chromium Base Alloy. I—Effect of Solution Treating Temperature," by C. Yaker and C. A. Hoffman, Lewis Flight Propulsion Laboratory, NACA; Technical Note 2320, March, 1951.

4 "Effects of an Aging Treatment on Life of Small Cast Vitallium Gas Turbine Blades," by Charles A. Hoffman and Charles Yaker, Lewis Flight Propulsion Laboratory, NACA; Technical Note 2052, March, 1950.

Production Facilities Grow

General Steel Castings Corp., Granite City, Ill., is engaged in a multimillion dollar expansion of facilities at its Commonwealth plant in that city. It will result in an increase in production of both regular and national defense work. A fourth open-hearth furnace is being erected, scheduled for operation some time in October and additional heat-treating facilities are to be constructed as part of the program.

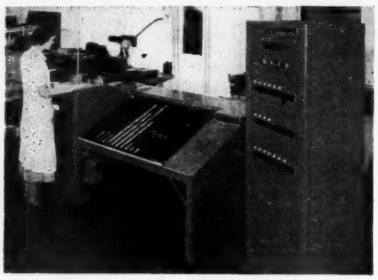


Dimensional control freezes high-quality standards

Another of the many industries served by Federal Gages

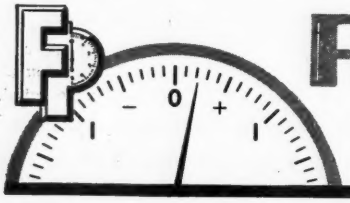
The thing that keeps a household electric refrigerator cold is its compressor — a small piston sliding smoothly in a close-fitting cylinder. The Westinghouse Electric Corporation makes every effort to obtain ultra-precise clearances in this mechanism.

That's why Westinghouse installed this Federal Electronic Sorting Gage. A group of four inspectors formerly did the work of this gage, but they were human. They occasionally made mistakes . . . like reading the size of a piston incorrectly, or putting the piece in the wrong size category. Now, with this one Federal Gage, all pistons and piston pins are gaged accurately and all come to rest in their correct size groups automatically. The gage cuts inspection costs, reduces rejects, and eliminates the possibility of improperly sized parts at Assembly. It helps Westinghouse to keep the production line rolling smoothly— to sell *high-quality* refrigerators.



Sorts pistons into 16 categories and two reject groups—piston pins into 10 categories and two reject groups. Handles same number of parts formerly gaged by four inspectors. Gage automatically stops when any size category is full. Tolerance per category: .0001"

Here is but one example of the more than 20,000 individual gage designs in the Federal engineering files — true testimony of the trust that people place in Federal Gages. This fund of practical gaging knowledge is available to you, too! If dimensional control is your problem, consult Federal *first*. It's the natural and economical thing to do. Federal Products Corporation, 1218 Eddy Street, Providence 1, Rhode Island.



FEDERAL

Largest manufacturer devoted exclusively to designing and manufacturing all types of DIMENSIONAL INDICATING GAGES.

CALENDAR OF MEETINGS

† Denotes first listing in this column.

September 3-7, American Chemical Society: Annual meeting, Hotel Statler, Washington. Society address: 1155 16th St. NW, Washington 6. Executive secretary: Alden H. Emery.

September 4-6, Liquefied Petroleum Gas Association: Pacific Coast convention, Fairmont Hotel, San Francisco. Association address: 11 S. La Salle St., Chicago 3. Executive vice president: Howard D. White.

September 5-7, American Hot Dip Galvanizers Association Inc.: Annual meeting, The Greenbrier, White Sulphur Springs, W. Va. Association address: 2311 First National Bank Bldg., Pittsburgh. Secretary: Stuart J. Swensson.

September 6-7, Rail Steel Bar Association: Semi-annual meeting, The Broadmoor, Colorado Springs, Colo. Association address: 38 S. Dearborn St., Chicago. Secretary: W. H. Jacobs.

September 8-9, New York; September 14-15, Washington — International Union of Pure and Applied Chemistry: Bi-annual meeting. Chairman, U. S. division: Prof. W. Albert Noyes Jr., University of Rochester.

September 10-13, International Congress of Pure and Applied Chemistry: New York. Chairman, U. S. division: Dr. Arthur B. Lamb, Harvard University.

September 10-14, International Foundry Congress: Brussels. Address: General Secretary, Foundry Congress, c/o Fabrimetal, 17 Drapiers St., Brussels.

September 10-14, Instrument Society of America: National instrument conference and exhibit, Sam Houston Coliseum, Houston. Society address, 921 Ridge St., Pittsburgh 12. Secretary: Richard Rimbach.

September 10-15, Annual Industrial Engineering Conference: Mechanical Department, Industrial Engineering Division, Michigan State College, E. Lansing, Mich.

September 11-13, Society of Automotive Engineers: Tractor meeting, Hotel Schroeder, Milwaukee. Society address: 29 W. 39th St., New York. Secretary: John A. C. Warner.

†September 12, Steel Kitchen Cabinet Institute: Fall meeting, Hotel Cleveland, Cleveland. Institute address: Engineers Bldg., Cleveland 14. Executive secretary: S. S. Keeney.

September 14-16, American Society of Sanitary Engineering: National convention, Hotel Statler, Detroit. Society address: 1308 Freemont St., McKeesport, Pa. Secretary: T. M. Dugan.

September 17-19, Allied Railway Supply Association: Fall meeting and exhibit, Hotel Sherman, Chicago. Association address: Box 5522, Chicago 80. Secretary: Charles F. Weil.

September 21-22, National Association of Waste Material Dealers Inc.: Fall meeting, Saranac Inn, Upper Saranac Lake, N. Y. Association address: 1109 Times Bldg., New York 18. Secretary: Clinton M. White.

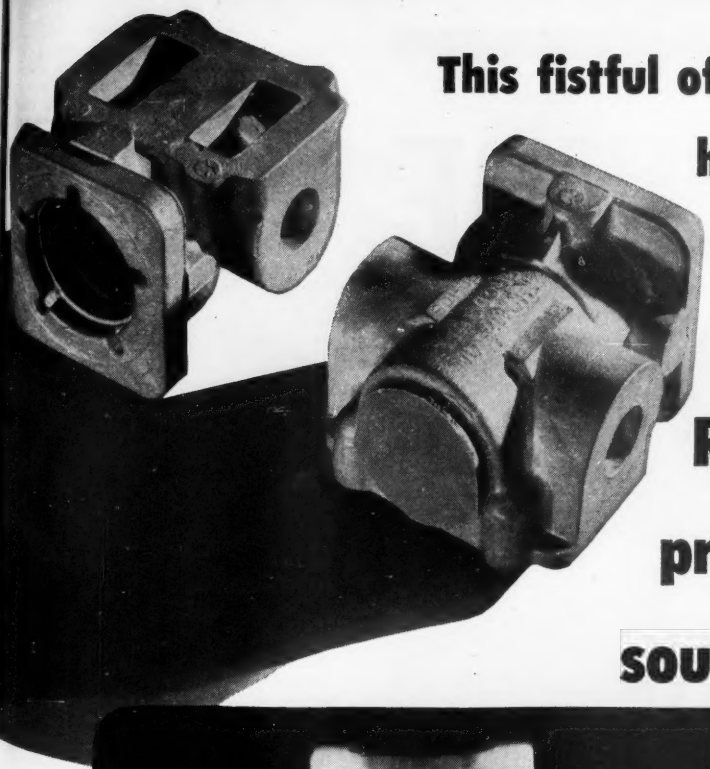
September 24-25, Steel Founders Society of America: Fall meeting, The Homestead, Hot Springs, Va. Society address: 920 Midland Bldg., Cleveland 20. Secretary: F. Kermit Donaldson.

September 25-28, American Society of Mechanical Engineers: Fall meeting, Hotel Radisson, Minneapolis. Society address: 29 W. 39th St., New York. Secretary: C. E. Davies.

September 26-29, Marking Device Association: National convention, Edgewater Beach Hotel, Chicago. Association address: 134 N. La Salle St., Chicago. General manager: E. F. Way.

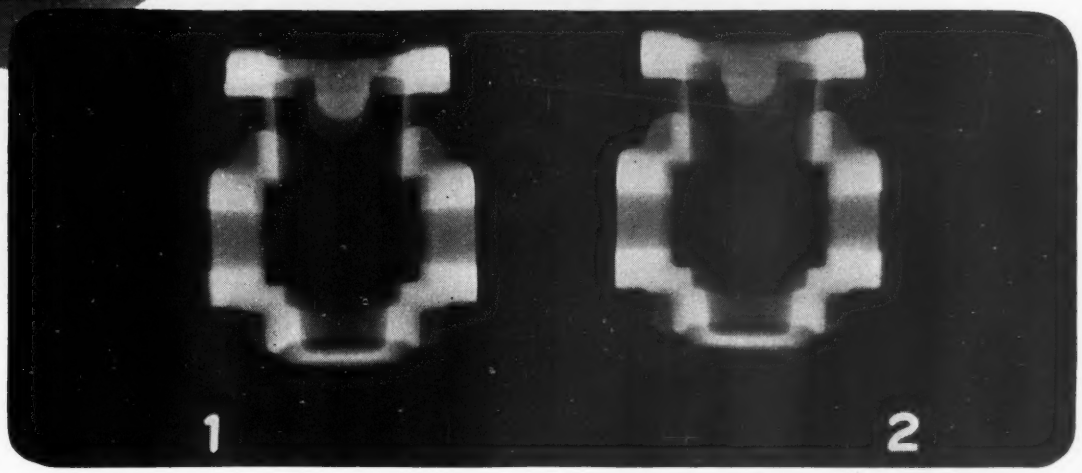
September 27-30, Multiple V-Belt Drive & Mechanical Power Transmission Association: Annual meeting, The Broadmoor, Colorado

(Continued on p. 104)



This fistful of pump has a plane-size job...

Radiography proves it sound



PERFORMANCE requirements for airplane parts run high. They must be strong and rugged. Even with light alloys, demand is for less weight.

Here is where radiography plays an important part. For the designer, knowing all castings used will prove sound, can plan to use the minimum of metal and still maintain needed safety margins.

Foundries making large or small castings—of light alloys or heavy metals—find it valuable to radiograph their castings. Then they know only highest quality work is released. Through pilot castings prior to large production runs, radiography frequently indicates ways in which methods can be improved to save time and increase yield.

Your x-ray dealer will gladly discuss how radiography can improve your plant operations. And if you wish, we will send you a free copy of "Radiography as a Foundry Tool."

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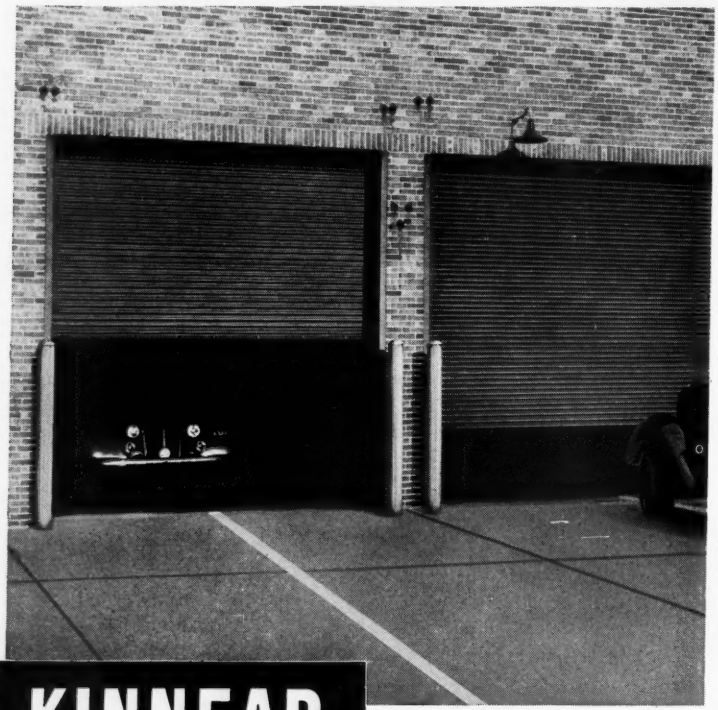

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Clear The Entire Opening

You get full use of all doorway space when you equip openings with Kinnear Rolling Doors. They clear the doorway completely—from jamb to jamb and from floor to lintel. Even the floor, wall and ceiling space *around* the doorway remains clear and usable at all times.

The doors rise straight upward, coiling above the lintel. Trucks, material, or equipment can be left within inches of the door curtain, both inside and outside the entrance, without blocking door action in any way.

The rugged all-steel construction of Kinnear Rolling Doors assures an extra measure of protection against theft, intrusion, storm damage, and fire. Kinnear Rolling Doors are built any size, with manual, mechanical or motor operation. Write for complete information.

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SAVING WAYS IN DOORWAYS — KINNEAR ROLLING DOORS

(Continued from p. 102)

Springs, Colo. Association address: 7 W. Madison St., Chicago 2. Executive Secretary: Harry P. Dolan.

September 24-25, American Coke & Coal Chemicals Association: Annual fall meeting. Skytop Lodge, Skytop, Pa. Institute address: 711 14th St. NW, Washington. Executive secretary: Samuel Weiss.

September 24-26, National Truck Body Mfrs. & Distributors Association: Annual convention and suppliers exhibit, Chalfonte-Haddon Hall, Atlantic City, N. J. Association address: 346 Connecticut Ave. NW, Washington. Secretary-manager: Shipley D. Burton.

OCTOBER

October 1-2, American Machine Tool Distributors Association: Annual meeting, Chalfonte-Haddon Hall, Atlantic City, N. J. Association address: 1900 Arch St., Philadelphia. Executive secretary: Thomas A. Fernley Jr.

†**October 1-4, Association of Iron & Steel Engineers:** Fall meeting, Sherman Hotel, Chicago. Association address: 1010 Empire Bldg., Pittsburgh. Managing director: T. V. Ess.

†**October 2-4, Society of Industrial Packaging & Materials Handling Engineers:** Exposition and "short course," Hotel Cleveland, Cleveland. Association address: 20 W. Jackson Blvd., Chicago. Secretary: H. E. Brill.

†**October 3-6, Pressed Metal Institute:** Fall meeting, Drake Hotel, Chicago. Institute address: 13210 Shaker Square, Cleveland 20. Managing director: Orrin B. Werntz.

†**October 8-12, National Hardware Show:** Grand Central Palace, Atlantic City, N. J. Managing director: Frank Yeager.

†**October 8-13, Concrete Reinforcing Steel Institute:** Fall meeting, Grove Park Inn, Asheville, N. C. Institute address: 38 S. Dearborn St., Chicago 3. Managing director: H. C. Delzell.

†**October 10-12, Porcelain Enamel Institute Inc.:** Shop practices forum, Deshler-Wallick Hotel, Columbus, O. Institute address: 1010 Vermont Ave. NW, Washington. Secretary: Edward Mackaser.

†**October 9-12, The Electrochemical Society Inc.:** Centennial — Fall convention, Hotel Statler, Detroit. Society address: 235 W. 102nd St., New York 25. Secretary: Henry B. Linford.

†**October 11, American Iron & Steel Institute:** Regional technical meeting, Hotel Warwick, Philadelphia. Institute address: 350 Fifth Ave., New York. President: Walter S. Tower.

†**October 12-14, Metal Treating Institute:** Annual meeting, Detroit. Institute address: 271 North Ave., New Rochelle, N. Y. Executive secretary: C. E. Herington.

†**October 13-17, Packaging Machinery Manufacturers Institute:** Fall meeting, Mid Pines Club, Southern Pines, N. C. Institute address: 342 Madison Ave., New York 17. Secretary: Helen L. Stratton.

†**October 14-18, American Hardware Manufacturers Association:** Fall meeting, Marlborough - Blenheim Hotel, Atlantic City, N. J. Association address: 342 Madison Ave., New York 17. Secretary: Arthur L. Faubel.

†**October 13-14, American Welding Society:** Annual meeting, Book-Cadillac Hotel, Detroit. Society address: 33 W. 39th St., New York 18. Secretary: J. G. Magrath.

†**October 13-14, American Society for Metals:** Annual seminar, Hotel Statler, Detroit. Society address: 7301 Euclid Ave., Cleveland. Secretary: W. H. Eisenman.

†**October 15-17, American Gas Association:** Annual meeting, Kiel Auditorium, St. Louis. Association address: 420 Lexington Ave., New York 18. Secretary: Kurwin R. Boyes.

†**October 15-19, American Society for Metals:** National Metal Congress & Exposition, Statler Hotel, Detroit and Michigan State Fairgrounds. Society address: 7301 Euclid Ave., Cleveland. Secretary: W. H. Eisenman.

†**October 15-19, The World Metallurgical Congress:** Hotel Statler, Detroit. Sponsored by American Society for Metals. Manager: W. H. Eisenman; director: Dr. Zay Jeffries.

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ARE YOUR BEST POWER BUY— AT ANY PRICE

They ASSURE high maneuverability of trucks ... rapid, accurate handling of material ... PROVIDE uniform rate of material handling with no unscheduled down time ... SHOW lowest costs of operation, maintenance, repair, depreciation, inherently safe. Call in an Exide Representative, and let him prove these facts.

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Iron and Steel *need protection too!*

If it's made of iron or steel,
and exposed to the elements,
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Hot-Dip Galvanized—*sealed in zinc!*

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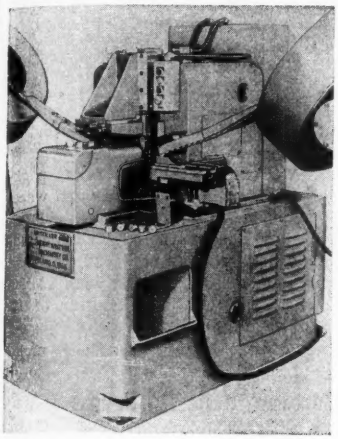
New Products and Equipment

Cam-Controlled Automatic

Motch & Merryweather Machinery Co., 715 Penton Bldg., Cleveland 13, O., has added a second model to its line of cam automatic forming machines. All machine functions are mechanically controlled by one main camshaft. Model illustrated turns the outside diameter and chamfers one



end of laminated silicon steel motor rotors. Varied lengths of any one diameter can be handled.

Cam-actuated loading mandrels automatically locate in the center hole of each piece and force the piece against the hardened drive spurs mounted on the face of each spindle while the magazine slides retract and reload. Tool slide rapid advances downward to position and feeds horizontally across diameter of work. Tool slide is then withdrawn to dwell position where a second tool chamfers the trailing edge of the piece. Loading mandrels withdraw from the workpieces allowing them to fall into take-off chutes. Production is 800 pieces per hour.

Check No. 1 on Reply Card for more Details

Drilling, Tapping Speed Varied

A line of variable speed drilling and tapping machines is introduced by the Edlund Machinery Co., Cortland 4, N. Y. Speed changes in the model 2F are effected instantly by a handle controlled mechanism, no production time being lost by stopping to change belts or gears. An indicating dial shows the speed selected.

Spindle speed ranges from 200 to 2700 rpm are standard; additional speeds from 50 to 675 rpm are obtained with back gears. Capacity is ¾-inch in steel, 1-inch with back gears or ⅞-inch in cast iron, 1¼-inch with back gears. Standard machines are available with 1, 2, 3, 4, 6 or 8 spindles; in pedestal or round column types; and with 8-inch or 15-inch overhang distance from column to center of spindle.

Check No. 2 on Reply Card for more Details

Vibration Isolated

Single-phase, capacitor induction motors in the Tri-Clad line are being offered with a resilient-base construction by small and medium motor divisions, General Electric Co., Schenectady 5, N. Y. This construction is available on motors rated from ½ to 5 hp for use where freedom from vibration and extra-quiet operation are required. Resilient base isolates torque pulsation so that it is not transmitted to the driven machine.

A totally enclosed built-in transfer switch to keep foreign matter from the contacts and a centrifugal mechanism designed for long life are other features of the motor. Except for the 5 hp size, which uses 230 v only, the motors operate on 115/230 v, 60 cycle power supply. Automatic-reset thermal protective devices are available for use with the 1 and 5 hp, 1800 rpm models.

Check No. 3 on Reply Card for more Details

Gear Transferred Automatically

A straight line automatic loader developed by National Broach & Machine Co., 5600 St. Jean Ave., Detroit 13, Mich., permits shaving all gears of a two, three or four step cluster continuously and automatically by a battery of Red Ring diagonal shaving machines. This arrangement permits full view of the complete operation for the operator and set-up man. A single operator is needed to supply unshaved gears to the magazine feed of the first machine and to remove the completed gears from the discharge chute of the final machine. All handling between machines is done by automatic mechanical transfer mechanisms and each cutting cycle is automatic.

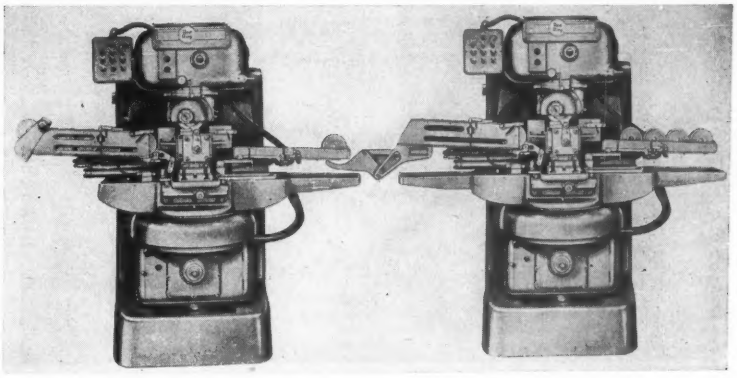
Individual shaving machines in the battery are arranged so that no appreciable time is lost due to differences in machine cutting time. Although all machines for a multiple operation are synchronized, each is individually controlled and may be operated individually when desired. Principal elements of the loader include a loading magazine having gravity feed, an intermediate feeder slide and an inclined discharge chute. An automatic gage at the entrance to the feed magazine of the first machine prevents the accidental inclusion of any oversize gears which might damage the shaving cutters.

Check No. 4 on Reply Card for more Details

Speedy Wire Coding

Metal code bands are stamped and applied to wire leads at rates up to 1200 per hour by air or electrically operated automatic wire banding machines made by Aircraft-Marine Products Inc., 2100 Paxton St., Harrisburg, Pa. Designed to insure permanent identification for electrical wires during installation or repair, bands applied by the machine will not loosen once they have been crimped.

Bands are fed into machines in strip form from spools. They are stamped and tagged as fast as operator can insert wires. Dies can be changed quickly by operators and



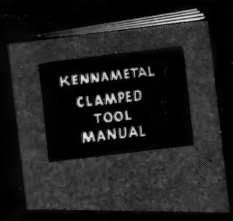
Tool Saving Tips

#4 of a series

KENNAMETAL TOOL MANUAL

Gives information on proper selection, application, and maintenance. Many useful tables, typical job layouts, etc. Vest pocket size.

USE KENNAMETAL SERVICE AIDS



CLAMPED TOOL MANUAL

Describes and illustrates how you can make a wide variety of special purpose mechanically-held tools in your own shop. Letter size.

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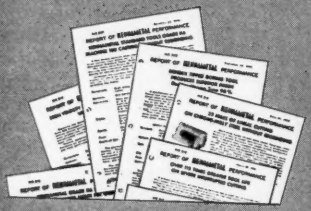
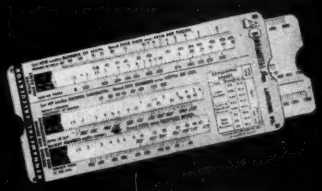


PERFORMANCE REPORTS

Contain specific data on tooling and methods used in hundreds of shops to save tools, floor-to-floor time, and grinding expense. Letter size.



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Automatically correlates various factors to give proper speed and feed rates for turning, boring, milling. Eliminates guesswork and calculating. Vest pocket size.

FIELD SERVICE

Our field engineers offer you the greatest collection of carbide tooling "know how" that is available through any one source.

All these service aids are available to you to help you get more work from fewer carbide tools. Ask your nearest Kennametal representative about them, or write to us.

KENNAMETAL® Inc., Latrobe, Pa.

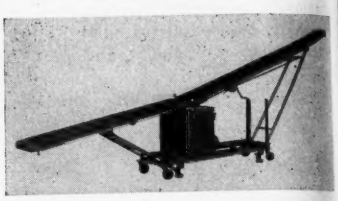
MANUFACTURERS OF SUPERIOR CEMENTED CARBIDES AND CUTTING TOOLS THAT INCREASE PRODUCTIVITY

have a capacity of from one to three digits per band.

Check No. 5 on Reply Card for more Details

Warehouse Stacker

Designed by Mathews Conveyer Co., Ellwood City, Pa., the Western type belt conveyor with power-driven receive is ideal for stacking operations. Unit moves easily over warehouse floors, features a reversible belt and



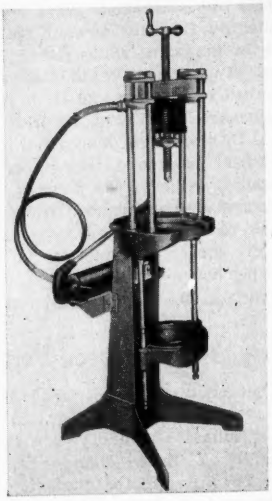
can be quickly and safely adjusted by one person.

Power receive section takes packages efficiently from roller and wheel conveyor lines. Units are shipped ready to operate with electrical equipment, including motor, starter and cord. They are available with 12 and 16-inch belt widths in lengths of 12, 16 or 19 feet.

Check No. 6 on Reply Card for more Details

Portable Pedestal Press

Owatonna Tool Co., 398 Cedar St., Owatonna, Minn., announces a pedestal press for use with the Power-Twin hydraulic puller. Press is portable and compact, having the base 20 x 21 inches. It may be temporarily or permanently installed in place near



permanent equipment to perform pulling or installing jobs.

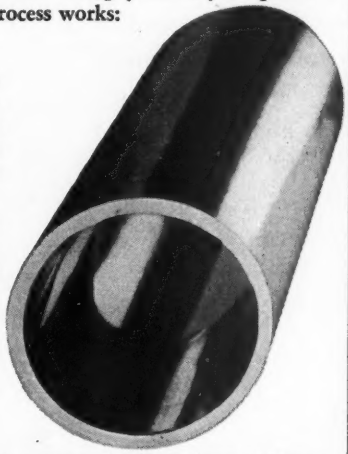
It is designed for use with the company's 17½-ton ram. Mounting a strong, open-throat press plate it provides a wide range vertical ad-

SO HIGH A FINISH...

NEED CYLINDER PARTS? New Rockrite Tubing comes with so high an inside finish that it is ready to go to work as hydraulic cylinders, shock absorbers and similar parts. Smooth, scratch-free inner surface requires *no machining* when used with leather or other soft packings. Only a light honing is needed for metal piston rings.

THE REASON? The Rockrite unique compression-sizing process cold-works the metal . . . insures close tolerances that pay off in your plant. Here's how this distinctively different process works:

- **Dies compress the metal against a mandrel, tending to iron out small irregularities on both the inside and outside surfaces. The metal flows from high spots in the same manner as when it is forged.**
- **A certain amount of planishing action also takes place on the inside surface of the tube as it elongates under the pressure of the dies and creeps forward while in contact with the mandrel.**
- **In no part of this operation is there any action which can produce longitudinal scratches. The metal is not drawn through a die and over a mandrel.**



SIZES? Rockrite cylinder-finish tubing comes in bores from 1½" to 5½", depending on wall thickness. Get additional facts and figures from Joseph T. Ryerson & Sons Company, Chicago, national warehouse distributor, or write us direct.

ROCKRITE saves more than any other tubing

- **Higher cutting speeds**
- **Tools last longer between grinds**
- **Work-surface finishes are better**
- **Machined parts have closer tolerances**
- **Stations on automatics are often released for additional operations**
- **Extra-long pieces available — less downtime for magazine stocking and fewer scrap ends**
- **Closer tolerances often eliminate necessity for machining on outside or inside**

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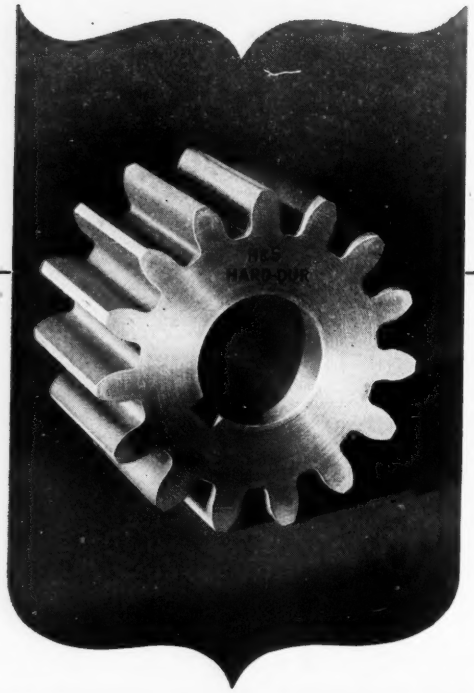
when the job is tough . . .



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• "HARD-DUR" Gears not only preserve tooth form because the material is highly wear resistant and the gears are scientifically heat treated to obtain maximum physical properties... but they have involute teeth that are produced to high standards of accuracy by very careful workmanship. In fact "HARD-DUR" Gears are so much stronger, harder and more wear-resistant, that they are guaranteed to have at least four or five times the life of similar untreated gears...and at only 50% extra in cost.

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5112 HAMILTON AVE. • CLEVELAND 14, OHIO, U. S. A.

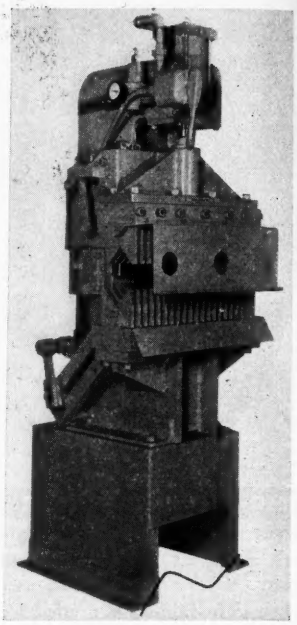
Send note on Company Letterhead for 488-Page Catalog 49

justment and can be used for pulling wheels, pulleys, bushings, collars, etc. Model OTC Y-102 includes the pedestal and press frame, other accessories are available.

Check No. 7 on Reply Card for more Details

Fast Core Rod Straightening

Development of an air operated high speed, automatic ejector or unloading device is announced by General Riveters Inc., 785 Hertel Ave.,



Buffalo 7, N. Y. The capacity of the machine is from ¼ to ½-inch core rod. The straightening V block die surface is 24 inches right to left.

Machine was designed for foundries producing automotive and other classes of cylinder castings and cast iron radiator where several core rods are used in each piece manufactured and may be bent in getting them out of the finished casting. The machine can be furnished without the automatic unloading device and with shorter dies, the loading and unloading being done by hand.

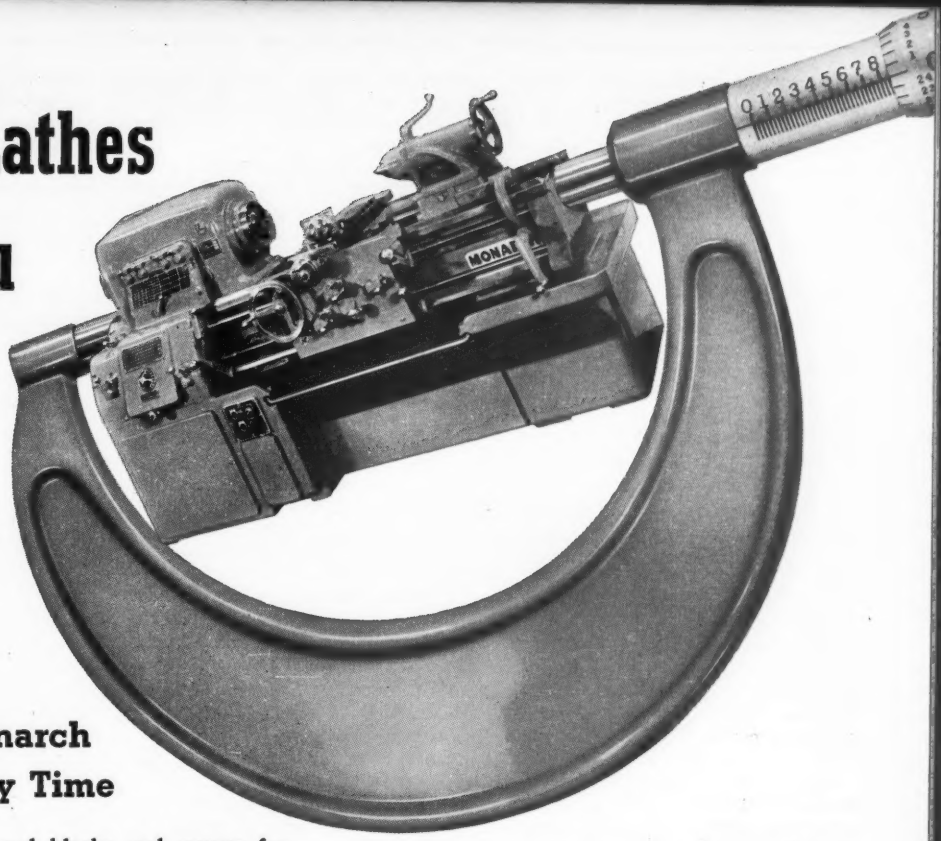
Check No. 8 on Reply Card for more Details

Grease Measured Accurately

An improved measuring device for delivering an accurate amount of grease to the stearing gear housings as they proceed down the assembly line is designed by J. N. Fauver Co. Inc., 49 W. Hancock, Detroit 1, Mich. It consists of an air line filter, hand operated air valve, air operated power cylinder and a measuring cylinder.

At start of operation air cylinder piston is at rest at rod end. When

Check Lathes Like You Check Their Output



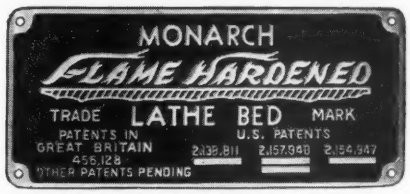
...and it's Monarch Series 60 Every Time

You have your mikes and blocks and gauges for checking lathe production. But what kind of test is there for the lathe itself? How can you gauge its performance *before* you buy—at the time when you're establishing the standards for the quality and costs of your entire operation?

This way! Lathe performance is only a reflection of the quality built into a lathe—of its features of design and construction. *So check features*—and check them against the handy yardstick here.

Check, too, the strength, weight and power built into each machine. You not only find every desirable construction feature in the Monarch Series 60—you'll find that *almost every one of them was originated* by Monarch. Doesn't that make the Monarch Series 60—Toolmaker's and Engine Lathes, both—the standard that you're looking for? Write for Bulletin 1113, and see for yourself . . . *The Monarch Machine Tool Company, Sidney, Ohio.*

LATHE FEATURE CHECK-LIST	MONARCH	LATHE B
1 Totally enclosed gearbox and end gearing—for sustained accuracy	Yes	?
2 Automatic pressure lubrication—for long life at original efficiency	Yes	?
3 All anti-friction bearings—for peak power and reduced maintenance	Yes	?
4 Hardened, ground or shaved, wide helical gears in headstock—for precision power, easier shifting	Yes	?
5 American Standard Camlock Spindle Nose—for quick, rigid chuck and fixture mounting	Yes	?
6 Flame-Hardened and Precision-Ground Integral Bedways—for sustained accuracy throughout the life of all four ways	Yes	?
7 All critical parts made of hardened alloy steel—for long, trouble-free life	Yes	?



Your proof of protection on all Series 60 Toolmaker's and Engine Lathes, available in 12", 14", 16" and 20" swings—each in various lengths. Most can be equipped with either one of the three Monarch Tracer Controls.

Monarch
ACCURACY • ECONOMY • LONG LIFE
TURNING MACHINES

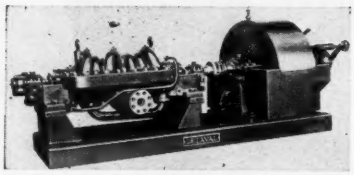
FOR A GOOD TURN FASTER . . . TURN TO MONARCH

hand valve is actuated, air cylinder moves to fill the measuring cylinder. Adjustable stop contacts pilot valve which causes hand operated valve to return, then air cylinder piston reverses and discharges a measured amount of lubricant.

Check No. 9 on Reply Card for more Details

Opposed Impeller Pumps

Multistage opposed impeller pumps designed for general medium pressure and temperature service up to approximately 1000 gpm and 1200 psi for temperatures to 350-400° F are announced by De Laval Steam Turbine Co., Trenton 2, N. J. They are



well suited to boiler feed service, handling liquids ranging from pro- to strong caustic and general water services such as descaling.

The "Oppeller" pump has a horizontally split casing with suction and discharge nozzles on opposite sides of the lower half of the casing. Impellers are mounted back to back to balance axial thrust and the volutes are staggered 180 degrees to balance radial thrust. Bolted in stuffing box provides a means of applying a plain box with lantern ring for suction lifts; a water cooled box for high temperatures and high pressure; conventional or special, single or double mechanical seals or a breakdown bushing and leak-off arrangement.

Check No. 10 on Reply Card for more Details

Spark Danger Reduced

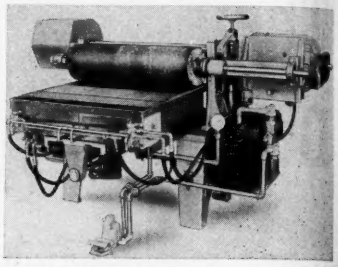
Gasoline fork trucks are available in spark-enclosed models announces Philadelphia Division, Yale & Towne Mfg. Co., 11000 Roosevelt Blvd., Philadelphia 15, Pa. They are designed to provide maximum possible safe operation in gas and dust laden areas. Protection is accomplished by shielding electrical equipment against sparking, providing a water type exhaust manifold and water cooled muffler and using static conductive tires.

Fuel tank is of heavy welded steel construction surrounded by strong structural members as protection against rupture. Special filler cap seals automatically, and is shielded from the engine compartment so overflow can't drop on electrical system or hot engine parts. An up-draft carburetor with a leak tight metal air horn is connected directly to an air cleaner of the backfire arrestor type. All low tension wires and cables are enclosed in flexible nonmetallic tubing with metal enclosures to receive wires and terminal connections. All high tension wires are enclosed in flexible grounded metal tubing.

Check No. 11 on Reply Card for more Details

Holds Nonmagnetic Material

A surface finishing machine capable of holding nonmagnetic items without interferring with coverage over the entire surface is being introduced by Clair Mfg. Co., Olean,



N. Y. Model 203 using a vacuum chuck answers the problem of holding items made of brass, copper, silver, etc.

The horizontal, electro-hydraulic

"ONE always stands out"

and among refractory dolomites it's...

BAKER'S MAGDOLITE

In these days of highly competitive 100% of capacity production, it pays to use "both hands." And it pays to use *Baker's Magdolite*, the absolutely dependable refractory dolomite.

Magdolite's superior chemical, physical, and mineralogical composition assure you of minimum maintenance and repairs. When you buy... specify *Baker's Magdolite*... the logical choice in refractory dolomites.

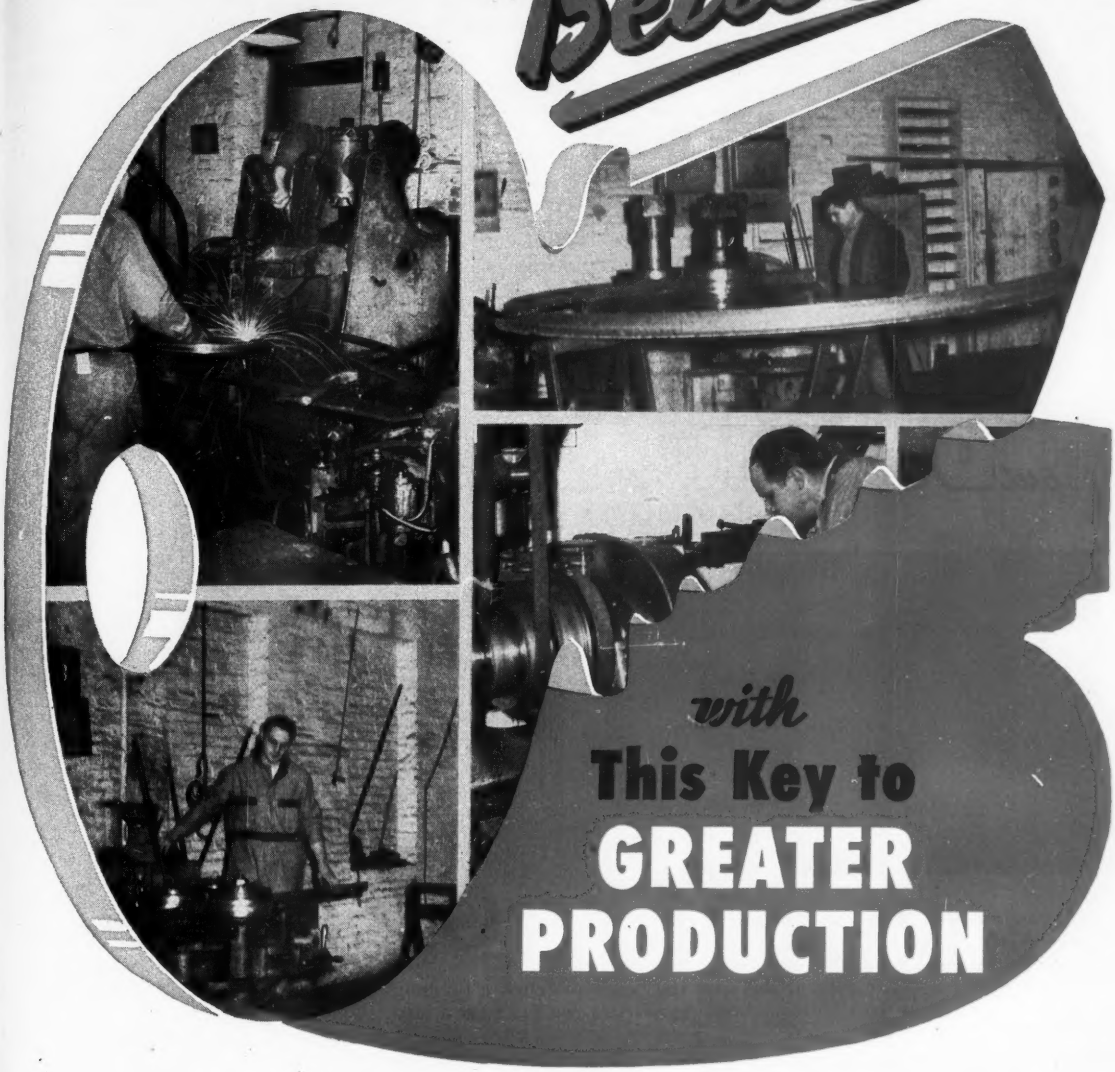
ALWAYS 5 WAYS BETTER
- Composition
- Preparation
- Economy
- Strength
- Quality

JEBCO PRODUCTS
MAKERS OF BAKER'S MAGDOLITE

THE J. E. BAKER COMPANY
YORK, PENNSYLVANIA

PLANTS: Billmeyer, Pennsylvania • Millersville, Ohio

LOCK UP THE *Better* JOBS



with

This Key to GREATER PRODUCTION

Stands to reason you can't handle many *more* jobs but you can take on better *quality* jobs . . . jobs which return a better profit . . . jobs which demonstrate your top ability.

Well, you can go after and lock up the better jobs when you select King to supply your ring requirements. King bends and welds from bar stock, bands, flanges, angles, special shapes to your specifications. Make King your ring department. Save time, money, material, labor. A phone call, a wire, a letter will start King working as your Ring Department.

King

FIFTH WHEEL COMPANY
2915 N. 2ND ST., PHILADELPHIA 33, PA., NE-4-2444

machine has a moving work table consisting of a perforated plate mounted over a sealed air space that is connected to a vacuum pump through a 4-way spring-return foot valve. Working area is 38 x 36 inches with the length of the in and out stroke of the vacuum table adjustable from ¾ to 36 inches and motion sideways is adjustable from ½ to 1¾ inches.

Check No. 12 on Reply Card for more Details

High Starting Torque

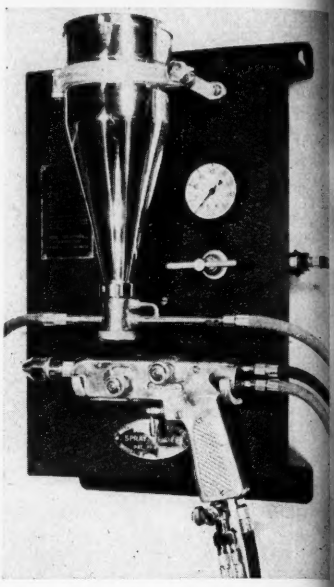
Century Electric Co., 1806 Pine St., St. Louis, Mo., has a special service, split phase, fraction horsepower motor in production. The motor has a high starting torque for use where high starting current is not objectionable. Breakdown torque is in accordance with NEMA standard for the basis of rating.

Motor features include: Rigid cast-iron end brackets of drip-proof design, welded steel frame, feet welded to frame and held to accurate shaft height dimension, phosphor bronze sleeve bearing with thrust collar and wool yarn lubrication with reserve oil capacity. Shaft is precision ground, rotor is high pressure cast aluminum

Check No. 13 on Reply Card for more Details

Soraywelder Improved

Wall Colmonoy Corp., 19345 John R St., Detroit 3, Mich., announces a model B Spraywelder powder metallizing unit for use with its process. Uniform overlays of hard facing alloys are applied using metalli-



ing procedure, and then the overlay is bonded to the base metal. The process can also be used with a variety of nonferrous metals.

Some improvements in the current model are: Lighter weight, greater capacity air filter, air regulator at convenient height, more positive air and powder control valves, new trigger mechanism, increased cooling chamber in head and locked feed mechanism on carburetor that eliminates possible change in powder feed setting.

Check No. 14 on Reply Card for more Details

Floating Type Center

Ready Tool Co., Bridgeport, Conn., has developed a new adjustable floating type center with which expansion type hand reamers can be correctly ground so that reamer teeth will be concentric with front pilot surface. This operation done in a universal tool and cutter grinder eliminates a cylindrical grinding operation. Centers are available in various tapers or straight shank sizes.

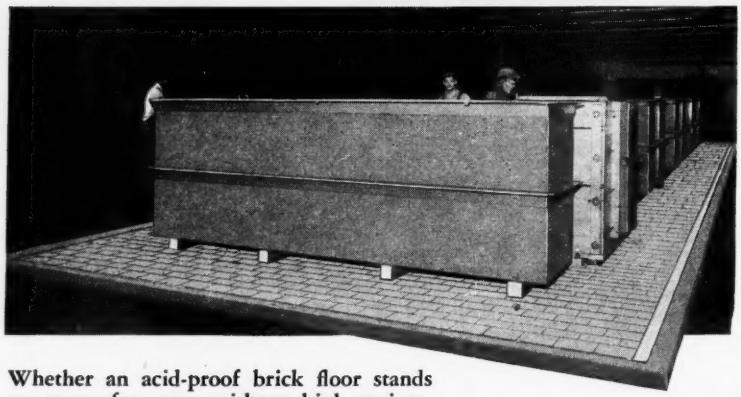
Check No. 15 on Reply Card for more Details

For Cutting Concrete

Concrete cutting diamond blades, made by Clipper Mfg. Co., Kansas City 8, Mo., reduce cutting time.

FOR LESS MAINTENANCE OVERHEAD

put Durisite and Brick UNDERFOOT



Whether an acid-proof brick floor stands up year after year without high maintenance costs depends mostly on the joints between the bricks. The thinner the joint the better the chance for long, trouble-free life. But with ordinary bonding mortars you can't get a joint much thinner than ¼".

Durisite *acid-and-alkali-proof* cement, however, bonds brick double-tight with *extra thin* joints . . . $\frac{3}{32}$" or less. Not only does Durisite make a thin, strong joint, but it makes a dense, non-absorbent joint.

Durisite is a resin-type cement, sets quickly by internal chemical reaction, is non-toxic, non-explosive, non-inflammable.

U. S. STONEWARE

PROCESS EQUIPMENT DIVISION, AKRON 9, OHIO

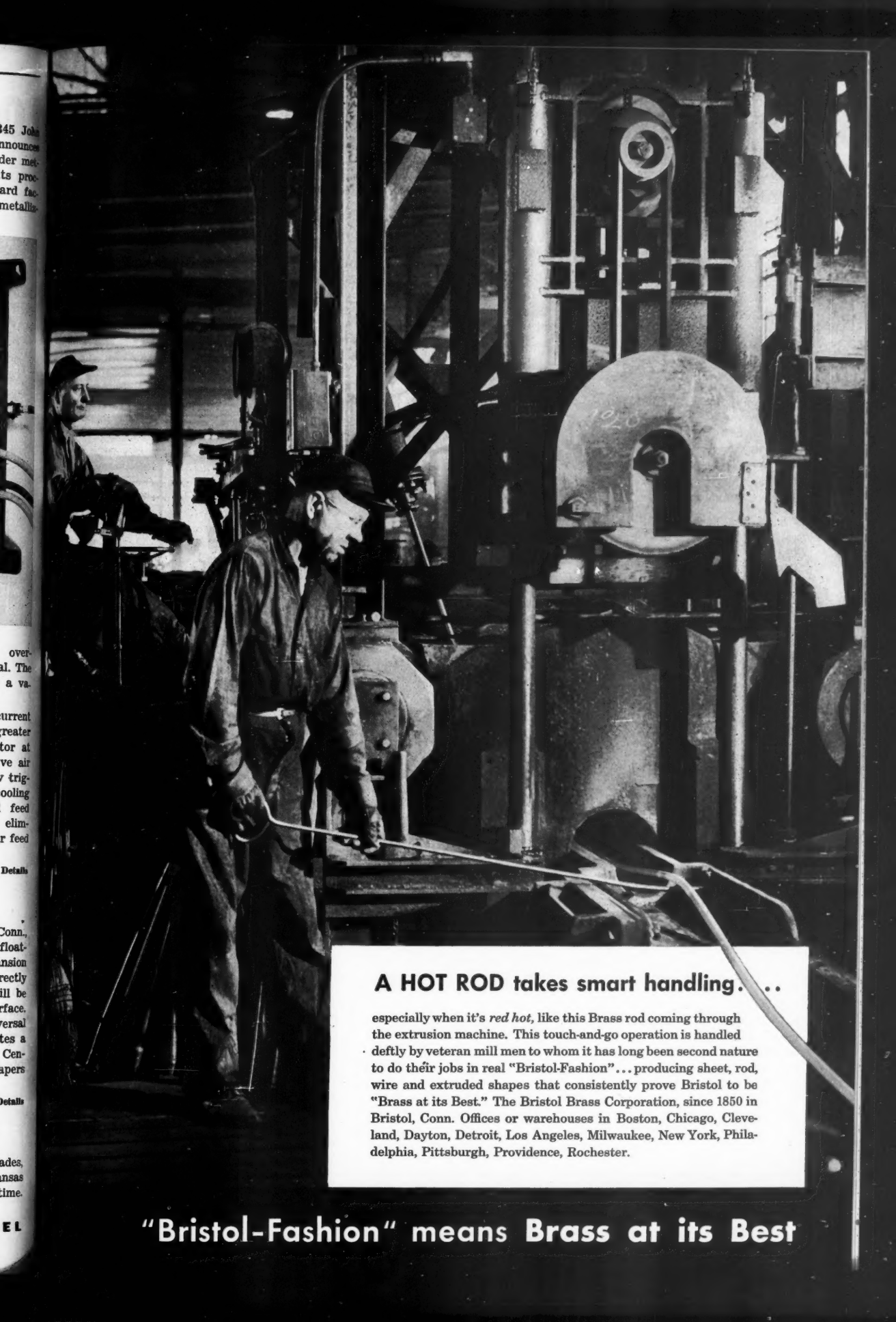
FOR A FLOOR YOU CAN INSTALL, AND FORGET, INSIST ON "U.S." TRIPLE-CONSTRUCTION

4" to 6" rigid concrete sub-base

Resilon corrosion-resistant protective membrane

"USSCO" Acid Brick bonded with double-tight Durisite thin joints.

The U. S. Stoneware Co. can supply all necessary materials for installation by your own workmen of a "triple-construction" acid-and-alkali-proof floor, or if you desire, we can handle the entire job, including labor and materials.



A HOT ROD takes smart handling. . .

especially when it's *red hot*, like this Brass rod coming through the extrusion machine. This touch-and-go operation is handled deftly by veteran mill men to whom it has long been second nature to do their jobs in real "Bristol-Fashion"... producing sheet, rod, wire and extruded shapes that consistently prove Bristol to be "Brass at its Best." The Bristol Brass Corporation, since 1850 in Bristol, Conn. Offices or warehouses in Boston, Chicago, Cleveland, Dayton, Detroit, Los Angeles, Milwaukee, New York, Philadelphia, Pittsburgh, Providence, Rochester.

"Bristol-Fashion" means **Brass at its Best**

Concrete containing limestone aggregate can be sliced up to 10 feet per minute when cutting at a depth of 1 inch. Blades are available in diameters from 8 to 18 inches and in thicknesses of 5/32 to 7/64-inch.

Check No. 16 on Reply Card for more Details

Flame Failure Safeguard

To provide complete flame failure protection and programming control for fully automatic commercial and industrial gas or oil burners as well as for combination gas/oil burners, Combustion Control Corp., Cambridge 42, Mass., offers an all new Fireye system for supervising burner operation. Its fail-safe circuits cause instantaneous shutdown of the burner upon failure of any component and prevent a start-up under any unsafe condition within the entire burner system.

Check No. 17 on Reply Card for more Details

Collet Chuck

Design of B & V collet chucks, available from Eric S. Johnson Co., Chicago 11, Ill., enables operator to secure a firm, tight grip with normal tightening pressure so that tools are held absolutely secure and cannot be loosened during work. Collet loosens simultaneously with the locking nut and milling cutters can be changed easily. Chucks have a rubber cushion set into an upper recess in the chuck body which prevents damage to double-end milling cutters and all long tools.

Check No. 18 on Reply Card for more Details

Dry Type Transformers

A new line of general purpose, dry-type transformers featuring class B insulation is announced by General Electric's Specialty Transformer and Ballast Divisions, Schenectady 5, N. Y. For single-phase, 60-cycle operation, the new design provides smaller transformers at an average weight reduction of 30 per cent throughout the line.

Check No. 19 on Reply Card for more Details

Electrical Tape

B. F. Goodrich Co., Akron, O., introduces a new type electrical tape made with Koroseal material. The adhesive is nontransferring and can be pressed onto a dry surface innumerable times without losing its stickiness. It will not transfer the adhesive from the face, lose its tackiness or ability to adhere, sticks snugly and securely to itself and insulation around copper wire. Tape has a dielectric strength of 8000 v, is waterproof, highly abrasion resistant and flameproof, resistant to acids, oil alkalies and corrosive salts.

Check No. 20 on Reply Card for more Details

Quick-Set Accelerators

Casting resin can be hardened without heat at room temperature in a few minutes with the use of Quick-Set, a liquid accelerator that gives higher physical properties to casting resins. Developed by Rezolin Inc., Los Angeles 16, Calif., it is possible to control the hardening time by increasing or decreasing amount of liquid used.

Check No. 21 on Reply Card for more Details

Heavy Duty Engine Oils

For lubrication of heavy duty gasoline engines and automotive type diesel engines that are operating under adverse conditions, a new series of heavy duty engine oils, Ursa oil X Sup. One 10, 20, 30, 40 and 50 is offered by Texas Co., New York 17, N. Y.

Check No. 22 on Reply Card for more Details

Demountable Caster Assembly

A demountable caster and wheel assembly is introduced by Aerol Co. Inc., Burbank, Calif. Top plate of the caster slides onto a mounting plate fixed in the basic structure of the unit to be moved and locks into place by a spring-type locking device.

Check No. 23 on Reply Card for more Details

Valve Ends Spool-Sticking

To overcome problem of spool sticking in four-way solenoid valves in high pressure hydraulic circuits used for long cycling operations, Denison Engineering Co., Columbus, O., developed a pilot operated valve that utilizes system pressures to move the spool. Solenoids are used only to operate small internal pilot valves. Valve is available in ¾ and 1½-inch sizes in both single and double solenoid types with provision for either external or internal pilot connections.

Check No. 24 on Reply Card for more Details

Water Repellent

H2-O-NO, a new clear silicone base liquid water repellent for exterior masonry surfaces is announced by Chem Industrial Co., Cleveland, O. It is claimed that one application will keep water out of masonry for periods up to five years. It enters from 1/16 to ⅜-inch into mortar upon application and then forms a silicone lining for the masonry pores and waterproofs the pore walls. However, it does not plug up pores or prevent transpiration of air.

Check No. 25 on Reply Card for more Details

Magnesium Ramp for Trucks

A magnesium ramp for truck docks is available from Penco Engineering Co., San Francisco 11, Calif. It is built of lightweight magnesium safety tread plate, all-welded construction, crowned to compensate for height differences, with beveled edges and safety side rails. Sizes range from 42 inches wide and 36 inches long to 48 inches wide and 60 inches long with a capacity range from 1000 to 5000 pounds.

Check No. 26 on Reply Card for more Details

Nonskid Grating Surface

Globe Co., Chicago, Ill., offers Grip-Strut grating for use where a nonskid grating surface is required. Grating appears as a diamond shaped pattern in which the percentage of open area is in excess of 75 per cent of the total recticulated surface. Struts or vertical members are joined by integral saddles to create lateral struts.

Check No. 27 on Reply Card for more Details

Face Shield

Tel-A-Shield, a new type face shield, made by Industrial Products Co., Philadelphia 33, Pa., is for use in operations such as chipping, grinding, spot welding, scaling, metal sawing, etc. It covers face, head, neck and ears and has cross ventilation that minimizes breathing of devitalized air.

Check No. 28 on Reply Card for more Details

Improved Shunt Connection

National Carbon Co., division of Union Carbide & Carbon Corp., New York 17, N. Y., offers a tamped shunt connection for diesel-electric traction motor brushes. The permanently sealed shunt utilizes a synthetic compound that further seals and strengthens the connection. Shunt will not pull out. It provides for better distribution of stress.

Check No. 29 on Reply Card for more Details

FOR MORE INFORMATION
on the new products and equipment in this section, fill in a card. It will receive prompt attention.

Helpful Literature

74. Rotating Gantry Crane

Clyde Iron Works, Inc.—24-page illustrated catalog "Clyde Whirleys" shows typical installations of these huge rotating cranes which can be mounted on stationary foundations, barges, self-propelled trucks or gantries. Models are available with up to 140-ft boom lengths and in capacities of over 70 tons with 40-ft load radius.

75. Chemical Coolant

F. E. Anderson Oil Co.—Lusol, an all-chemical metalworking solution, is the subject of 18-page illustrated booklet. It contains information on cleaning of machines, mixing and maintenance of coolant solutions, prevention of dermatitis and odor plus case histories of product in use.

76. Industrial Instruments

Minneapolis - Honeywell Regulator Co., Brown Instruments Div.—Instrumentation data sheet 10.0-6 deals with operation and application of new duplex ElectroniK recorder which simultaneously plots two totally independent variables on single chart.

77. Tool & Die Steels

Latrobe Electric Steel Co. — 86-page technical manual "Desegatized Brand" presents descriptions, heat treatment and applications of most popular types of high speed and tool and die steels. Typical analyses, properties, hardening and tempering procedures, and related information are given for high speed, nondeforming, oil hardening, hot work, punch & chisel, die, water hardening and carbon steels.

78. Copper Clad Metal

American Cladmetals Co.—"Electroshield, the New Copper Clad Metal" is title of 4-page illustrated bulletin on material which combines electrical and corrosion resistance properties of copper with strength of steel. This rolled laminate is usable for electrical equipment as well as in automotive, refrigeration, hardware, chemical and other industries.

79. Pipe Insulation

Pittsburgh Corning Corp.—24-page illustrated booklet "Foamglas Insulation for Piping and Process Equipment" discusses adventages of Foamglas cellular glass insulation and lists its properties; typical data for cold, intermediate and hot applications; and details for insulating tanks, ducts and equipment.

80. Strain Gages

Baldwin - Lima - Hamilton Corp. — Specifications and prices of SR-4 post-yield strain gages are listed in 1-page illustrated bulletin 322. Suitable for strains up to 10 per cent, these units are extremely accurate.

81. Antirust Wrapping

Nox-Rust Chemical Corp.—18-page illustrated pamphlet entitled "The Nox-Rust Vapor Wrapper 'How' Book" presents information on corrosion-preventive wrapping for metal parts and machinery. Typical applications as used by various companies are shown, and data on grades and length of protection are tabulated. List of rules for obtaining best results with wrapping is included.

82. Hard-Facing Electrodes

Alloy Rods Co.—16-page illustrated bulletin 5651 is descriptive of Wear-Arc hard-facing alloy electrodes for fast, economical rebuilding and creation of wear surfaces. Properties, application procedures, available sizes and applications are covered.

83. Work Rest Blades

Scully-Jones & Co.—4-page illustrated bulletin No. 11-50 and price list deal with segment type, tungsten carbide tipped work rest blades for centerless grinding applications. Types for Thrufeed, infeed and roller infeed work rests are shown.

84. Threaded Bars

Joseph T. Ryerson & Son, Inc.—"Ryerson Threaded Bar Service" is title of bulletin giving data on size range, lengths, kinds of threads, bending, and types and finishes of steel bars that are furnished threaded. It illustrates available accessories such as turnbuckles, nuts, washers and tank lugs.

85. Induction Heating & Melting

Ajax Electrothermic Corp.—Guidance for selection and application of induction heating and melting equipment is provided by 8-page illustrated bulletin 27A. Heating and melting performance of standard equipment is tabulated. Included are descriptions of furnaces, heaters and power sources.

86. Small-Hole Drill Presses

Hamilton Tool Co.—4-page illustrated bulletin V-47 outlines specifications of Varimatic super-sensitive variable-speed drilling machine which has 0.004 to 5/16-in. drilling capacity in all drillable materials. Spindle speeds range from 840 to 9300 rpm.

FOR MORE INFORMATION USE ONE OF THESE CARDS . .

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HELPFUL LITERATURE

87. Tool Catalog

Apex Machine & Tool Co.—Complete line of sockets, extensions, adapters and universal wrenches is listed in 122-page catalog No. 29. Illustrations, dimensional drawings and specifications on more than 5,000 tools are presented.

88. Bronze Welding Rod

Eutectic Welding Alloys Corp. — Application data and properties of EutecRod 148FC bronze welding rod for welding old, dirty and corroded cast and malleable iron are given in illustrated leaflet 443P.

89. Ball Bearing Data

General Motors Corp., New Departure Div.—"Factors in Mounting Ball Bearings in Aluminum Housings" is technical paper which offers guidance in this application of ball bearings for rotating shafts.

90. Electric Car Puller

American Hoist & Derrick Co.—8-page illustrated catalog No. 100-H-66 covers capstan, drum and continuous rope type electric car pullers used on rail sidings, at loading docks, on piers and in mines. Applications and specifications are given on each type.

91. Threaded & Plain Gages

Republic Gage Co. — Description, specifications, sizes and prices of line of plug and ring gages both threaded and plain are presented in 50-page catalog No. 51. Screw thread standards for Federal services, tolerances and dimensions are tabulated as well as equivalents in inches and millimeters.

92. Floor Surfacing

United Laboratories, Inc.—Information on how and where to apply Plastic Rock flooring as well as technical data about the product itself is found in 8-page illustrated brochure No. 200. Typical flooring applications are highlighted especially in those areas subjected to heavy foot and wheel traffic.

93. Bearing & Bar Stocks

Bunting Brass & Bronze Co.—Complete alphabetical, numerical and size listings of standard stock bearings, electric motor bearings and precision bronze bars are tabulated in 64-page illustrated catalog No. 46. Design and engineering data on operating principles, machining and installation of bearings are included. Catalog comes supplemented with price list.

94. Insulating Material

Richardson Co.—Mechanical, electrical and machining characteristics of grade T-815 laminated Insurok are outlined in 2-page data sheet No. 20.815.1. Also presented are properties and application information on this cotton fiber mat base phenolic laminate.

95. Portable Conveyors

E. W. Buschman Co.—8-page illustrated bulletin No. 15 on complete line of Roll-or-Wheel portable conveyors describes units which are available in standard 5 or 10-ft lengths in 12, 15 or 18-in. widths. Data are included on such accessories as 30, 45, 60 and 90-degree curved sections, three-way switches; tubular adjustable stands and package stops.

96. Belt Grinder

St. Paul Foundry & Manufacturing Co., Heston & Anderson Div.—Information on the abrasive belt machining method as well as on the Xpeditor, an abrasive belt grinder for high speed deburring operations is contained in 4-page bulletin X-1. Photos illustrate various machining applications, and specifications are listed.

97. Bar Pointing Machines

Kent Machine Co. — "Kent Bar Pointing or Chamfering Machines" is title of 4-page illustrated folder which fully describes both the standard manually-operated model and the fast air-operated machine. Capacities and specifications are listed on these machines which point ends of square, hexagon or round bars up to 2¼ or 3¼-in. maximum diameter.

98. Speed Reducers

Cleveland Worm & Gear Co.—4-page illustrated brochure entitled "Finest in Worm-Gear Drives" contains descriptions of line of speed reducers and drives. Included are type CU unit for cooling tower service, the Speedaire fan-cooled reducer and special units designed for specific applications.

99. Twist Drills

DoALL Co.—Complete line of twist drills is featured in 12-page illustrated catalog No. 51-816 containing information on taper shank, straight shank and three and four fluted drills; drill sets; countersinks; sleeves and sockets and carbide tipped masonry drills. Charted decimal equivalents and price listings are also given.

100. Expanding Mandrels

K. O. Lee Co.—Knock-Out expanding mandrels for holding work for turning, grinding and milling operations are described in 2-page illustrated catalog sheet. General-purpose and heavy-duty types are available for holes sizes from ⅜ to 5½ in.

FOR MORE INFORMATION USE ONE OF THESE CARDS . .

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7	27	47	67	87
8	28	48	68	88
9	29	49	69	89
10	30	50	70	90
11	31	51	71	91
12	32	52	72	92
13	33	53	73	93
14	34	54	74	94
15	35	55	75	95
16	36	56	76	96
17	37	57	77	97
18	38	58	78	98
19	39	59	79	99
20	40	60	80	100

STEEL 8-27-51

Penton Building, Cleveland 13, Ohio

Please send ☐ Literature ☐ Price Information ☐ Nearest source of supply on the items circled at the left.

NAME TITLE

COMPANY

PRODUCTS MANUFACTURED

ADDRESS

CITY and ZONE STATE

This card MUST be completely filled in. Please TYPE or PRINT

FIRST CLASS PERMIT No. 36 (Sec. 34.9 P.L.&R.) Cleveland, Ohio

BUSINESS REPLY CARD

No Postage Stamp Necessary If Mailed in the United States

4c POSTAGE WILL BE PAID BY—

STEEL

CLEVELAND 13, OHIO

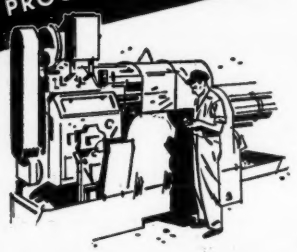
Penton Building

Readers' Service Dept.

How Republic Metallurgical Service

smoothed out a burnishing problem

PROGRESS REPORT:



Jan. 26 Republic Field Service gets trouble call at 10 a.m.

Jan. 26 Union Drawn Machining Specialist contacts customer at 1 p.m. same day. Learns of difficulty in burnishing reamed hole, sketches suggested tool to give 5 to 10 micro-finish.

Feb. 2 Union Drawn Machining Specialist calls back to check tool drawings; makes corrections.

Feb. 23 Another call to check tool progress finds it almost completed.

Mar. 1 Union Drawn Machining Specialist checks alignment of burnishing tool on six-spindle automatic. Suggests set-up changes.

Mar. 8 On call from customer, Union Drawn Field Man checks burnisher operation; spots construction fault; makes on-the-spot correction. Parts come off as predicted – burnished finish is under 10 micro-inches. He stays on job until late that night.

Mar. 9 Union Drawn Man returns to see if any difficulty has occurred. Finds job running smoothly, with machine efficiency greatly increased.

from problem

to production—

6 WEEKS!

● This Union Drawn Steel customer needed volume production of automatic transmission parts . . . needed it fast. Specifications called for a 40 to 60 micro-inch finish on a two-step internal bore, machined from Union Cold Drawn B-1113 2⅛" round bar stock.

Inability to hold the finish below 100 micro-inches caused difficulty. So, a rush call went out for Republic Metallurgical assistance.

A Union Drawn Machining Specialist looked over the job, and designed a new broaching fixture and head. According to the customer's latest report, "we are now running this job from 2 to 20 micro-inch finish . . . production has increased about 18%."

Need help on any steel machining problem of your own? You'll get it promptly from "MACHINABILITY Headquarters." Just write:

REPUBLIC STEEL CORPORATION
Union Drawn Steel Division • Massillon, Ohio
GENERAL OFFICES • CLEVELAND 1, OHIO
Export Department: Chrysler Building, New York 17, N. Y.

Republic UNION® COLD DRAWN STEELS

REPUBLIC STEEL® DS

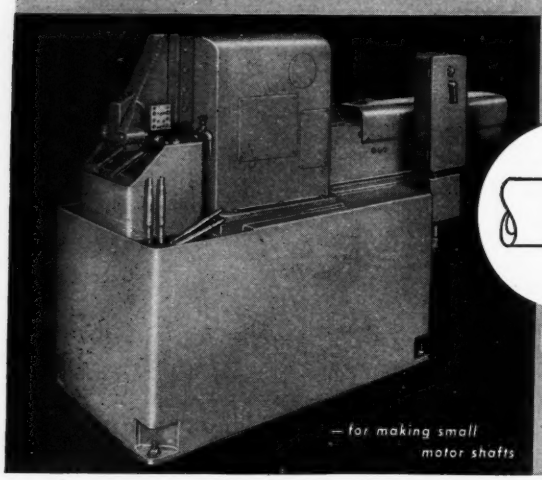
Free-Machining Bessemer, Alloy and Enduro Stainless Steels • • Union Cold Drawn Special Sections
Union Cold Drawn and Ground Rounds; Turned and Polished Rounds; and Turned, Ground and Polished Rounds (Union Precision Shafting)

MOTCH & MERRYWEATHER *Cam Automatics*—

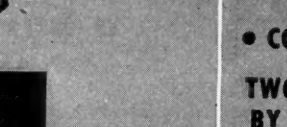
HOPPER LOADING OR BAR FEED

• COMPLETELY AUTOMATIC •

TWO SPINDLES CONTROLLED BY ONE MAIN CAMSHAFT!



— for making small motor shafts

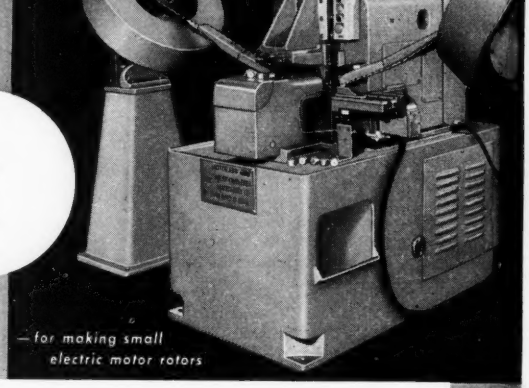


MOTOR SHAFTS

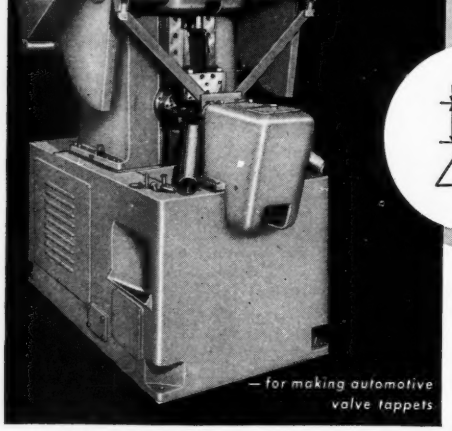
Operation: Turn, neck and chamfer.
Material: Steel tubing.
Production: 1400 pcs/hr. @ 100% efficiency.

SMALL MOTOR ROTORS

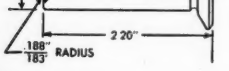
Operation: Turn O. D. and chamfer one end.
Material: Laminated silicon steel.
Production: 800 pcs/hr. @ 100% eff.



— for making small electric motor rotors



— for making automotive valve tappets



VALVE TAPPETS

Operation: Radius, neck and chamfer.
Material: 5120 steel.
Production: 2400 pcs/hr. @ 100% efficiency.

Stock feed, loading and locating mechanisms, collets and feeds of tool slides are controlled mechanically by a single camshaft —*simplicity itself.* M. & M. cam automatics require minimum attention and only occasional checking of work-pieces. If you will submit your drawings and specifications, we will tell you how Motch & Merryweather cam automatics can increase your *production with accuracy.*

Manufactured by

THE MOTCH & MERRYWEATHER MACHINERY COMPANY
715 PENTON BUILDING • CLEVELAND 13, OHIO
Builders of Circular Sawing Equipment, Production Milling, Automatic and Special Machines

PRODUCTION-WITH-ACCURACY MACHINES AND EQUIPMENT

The Market Outlook

HOPES are rising that the muddle in steel distribution under the Controlled Materials Plan will be pretty well cleared away no later than yearend. Government steel controllers are confident of it. Steelmakers and consumers are beginning to think they may be able to find their way out by that time. Government authorities report their surveys show overticketing on CMP account for fourth quarter is not as excessive as had been thought. Also, they state, considerable tonnage has been cancelled for one reason or another, and that most of the CMP tickets that have been stranded the past several weeks now have found homes with steel suppliers.

PROSPECTS— Outlook for the fourth quarter is little changed from that of recent weeks. The going for both producers and consumers of steel promises to be rough as adjustments are necessitated in scheduling in the direction of more realistic distribution. As screening of fourth quarter requirements progresses it is becoming apparent mill schedules in the period will come in for some revision. The mills now are overloaded with rated tonnage and this can only mean there will have to be some cancellation of tonnage, or deferment of shipments. Manufacturers of end-products, in all probability, will not get as much steel as they had expected. Precisely what they will receive must await processing of CMP applications by B classification consumers, and review of class A buyers' needs. This may take another week, possibly longer.

SCHEDULING—Proposed amendment to NPA's steel order M-1, permitting steelmakers to accept or reject at their discretion CMP orders without regard to date of receipt until 15 days prior to expiration of lead-time, is regarded an improvement over existing practice. The amendment largely will eliminate the first-come-first-served procedure of scheduling. It will allow the mills to care for their regular customers' requirements immediately after military needs, thus tending to remove much of the criticism of CMP distribution resulting from numerous consumers' inability to obtain rolling time with their regular sources of supply. It also will contribute importantly to more efficient distribution through elimination of much cross-hauling.

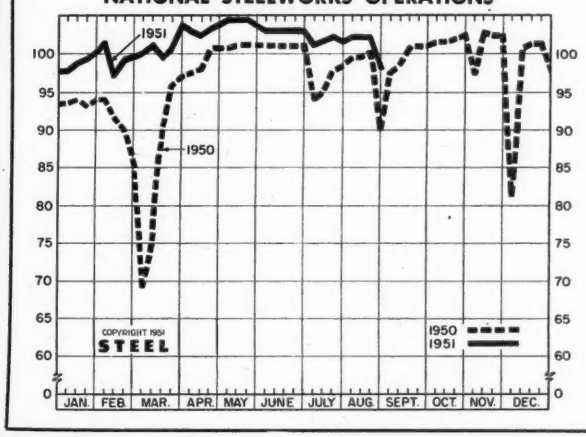
DELAY— Effects of the change in booking procedure will not be immediately evident. In fact, with the mills already loaded to overflowing for fourth quarter, it is likely the benefits of the proposed change in M-1 will not be felt much before January. In plates, for example, producers doubt the change will have any bearing on their scheduling over remainder of the year. Some steelmakers think the change in practice will be beneficial in last quarter only in the case of tonnage cancellations.

CONSTRUCTION— Important building and construction projects face delays over coming months as result of new restrictions and reductions in structural steel allotments. Not only is the scope of new construction limited, but some projects under way, including steel industry expansions, may be retarded. For example, work on the $400 million plant of the United States Steel Co. at Morrisville, Pa., may be slowed down. This plant now is possibly 16 per cent completed. Other steel expansion projects that are further along may be affected to lesser extent.

PRODUCTION— Railroad labor trouble in the Buffalo district last week caused a decline of 4 points to 98 per cent in the national ingot rate. Operations were off 76.5 points in Buffalo to 27.5 per cent.

PRICES— Currently, steel and related product prices are firm at ceiling levels. Delivered prices, however, will rise slightly after Aug. 28 to reflect the freight rate increase of 9 per cent which goes into effect. Also, prices on imported steel are likely to advance in line with recent increases effected in British quotations. Foreign iron ore prices are tending upward, as are prices on imported manganese. STEEL's weighted index on finished steel holds at 171.92, as does the arithmetical composite at $106.32.

NATIONAL STEELWORKS OPERATIONS



DISTRICT INGOT RATES

Percentage of Capacity Engaged at Leading Production Points

	Week Ended Aug. 25	Change	Same Week 1950	Same Week 1949
Pittsburgh	99.5	+ 1.5*	101.5	82
Chicago	105	0	75	89.5
Mid-Atlantic	100.5	0	98.5	77
Youngstown	101	— 4*	106	90
Wheeling	98.5	0	97	94
Cleveland	103	+ 1.5*	66	96.5
Buffalo	27.5	—76.5	104	98.5
Birmingham	100	0	100	100
New England	89	— 1	87	70
Cincinnati	101	— 5	103	93
St. Louis	93	+ 1.5	89	87
Detroit	107.5	+ 1.5	106	96
Western	105	+ 1	103.5	83
Estimated national rate	98	— 4	90	84.5

Based on weekly steelmaking capacity of 1,999,034 tons for 1951; 1,928,721 tons for second half, 1950; 1,906,268 tons for first half, 1950; 1,843,516 tons for 1949.

*Change from revised rate for preceding week.

The Metalworking Outlook—p. 35 Production-Engineering News—p. 71

Composite Market Averages

	Aug. 23 1951	Week Ago	Month Ago	Year Ago	5 Yrs. Ago
FINISHED STEEL INDEX, Weighted:					
Index (1935-39 av.=100)..	171.92	171.92	171.92	156.99	112.04
Index in cents per lb.	4.657	4.657	4.657	4.253	3.035
ARITHMETICAL PRICE COMPOSITES:					
Finished Steel, NT	$106.32	$106.32	$106.32	$94.50	$64.45
No. 2 Fdry, Pig Iron, GT..	52.54	52.54	52.54	46.85	28.17
Basic Pig Iron, GT	52.16	52.16	52.16	45.97	27.50
Malleable Pig Iron, GT ...	53.27	53.27	53.27	47.49	28.79
Steelmaking Scrap, GT ...	44.00	44.00	44.00	40.67	19.17

Weighted finished steel index based on average shipments and Pittsburgh district prices of the following 14 representative products during 5-year base period 1935-39: Structural shapes, plates, rails, hot-rolled and cold-finished bars, pipe, wire, nails, tin plate, hot and cold-rolled sheets, galvanized sheets, hot and cold-rolled strip. For complete explanation see STEEL, Sept. 19, 1949, p. 54.

Arithmetical steel price composite based on same products as the weighted finished steel index with the exception of rails, cold-finished bars, galvanized sheets and hot-rolled strip.

Basic and No. 2 foundry pig iron composites are based on average prices at Pittsburgh, Bethlehem, Birmingham, Buffalo, Chicago, Cleveland, Granite City, Youngstown. Malleable composite based on same points, except Birmingham.

Steelmaking scrap composite based on average prices of No. 1 heavy melting steel at Pittsburgh, Chicago and Philadelphia.

Comparison of Prices

Comparative prices by districts, in cents per pound except as otherwise noted. Delivered prices based on nearest production point.

FINISHED MATERIALS

	Aug. 23 1951	Week Ago	Month Ago	Year Ago	5 Yrs. Ago
Bars, H.R., Pittsburgh	3.70	3.70	3.70	3.45	2.50
Bars, H.R., Chicago	3.70	3.70	3.70	3.45	2.50
Bars, H. R., del. Philadelphia	4.20	4.20	4.20	3.93	2.86
Bars, C.F., Pittsburgh	4.55	4.55	4.55	4.10–15	3.10
Shapes, Std., Pittsburgh ..	3.65	3.65	3.65	3.40	2.35
Shapes, Std., Chicago	3.65	3.65	3.65	3.40	2.35
Shapes, del. Philadelphia ..	3.91	3.91	3.91	3.46	2.48
Plates, Pittsburgh	3.70	3.70	3.70	3.50	2.50
Plates, Chicago	3.70	3.70	3.70	3.50	2.50
Plates, Coatesville, Pa. ...	4.15	4.15	4.15	3.90	2.50
Plates, Sparrows Point, Md.	3.70	3.70	3.70	3.50	2.50
Plates, Claymont, Del.	4.15	4.15	4.15	3.90	2.50
Sheets, H.R., Pittsburgh...	3.60–75	3.60–75	3.60–75	3.35	2.425
Sheets, H.R., Chicago	3.60	3.60	3.60	3.35	2.425
Sheets, CR., Pittsburgh ..	4.35	4.35	4.35	4.10	3.275
Sheets, C.R., Chicago	4.35	4.35	4.35	4.10	3.275
Sheets, C.R., Detroit	4.55	4.55	4.55	4.30	3.375
Sheets, Galv, Pittsburgh..	4.80	4.80	4.80	4.40	4.05
Strip, H.R., Pittsburgh....	3.75–4.00	3.75–4.00	3.75–400.	3.50	2.35
Strip, H.R., Chicago	3.50	3.50	3.50	3.25	2.35
Strip, C.R., Pittsburgh	4.65–5.35	4.65–5.35	4.65–5.35	4.15–50	3.05
Strip, C.R., Chicago	4.90	4.90	4.90	4.30	3.15
Strip, C.R., Detroit	4.85–5.60	4.85–5.60	4.85–5.60	4.35–95	3.15
Wire, Basic, Pittsburgh....	4.85–5.10	4.85–5.10	4.85–5.10	4.50	3.05
Nails, Wire, Pittsburgh	5.90–6.20	5.90–6.20	5.90–6.20	5.30	3.75
Tin plate, box, Pittsburgh.	$8.70	$8.70	$8.70	$7.50	$5.25

SEMIFINISHED

Billets, forging, Pitts. (NT)	$66.00	$66.00	$66.00	$63.00	$47.00
Wire rods, ½-⅝", Pitts. ..	4.10–30	4.10–30	4.10–30	3.85	2.30

PIG IRON, Gross Ton

Bessemer, Pitts.	$53.00	$53.00	$53.00	$47–$50	$29.00
Basic Valley	52.00	52.00	52.00	46.00	28.00
Basic, del. Phila.	56.49	56.49	56.49	50.39	29.93
No. 2 Fdry, Pitts.	52.50	52.50	52.50	49.50	28.50
No. 2 Fdry, Chicago	52.50	52.50	52.50	46.50	28.50
No. 2 Fdry, Valley	52.50	52.50	52.50	46.50	28.50
No. 2 Fdry, Del. Phila. ..	56.99	56.99	56.99	50.89	30.43
No. 2 Fdry, Birm.	48.88	48.88	48.88	42.38	24.88
No. 2 Fdry (Birm.) del. Cin.	55.33	55.33	55.33	49.08	28.94
Malleable Valley	52.50	52.50	52.50	46.50	28.50
Malleable, Chicago	52.50	52.50	52.50	46.50	28.50
Charcoal, Lyles, Tenn.	66.00	66.00	66.00	60.00	33.00
Ferromanganese, Etna, Pa.	188.00	188.00	188.00	175.00	140.00*

* Delivered, Pittsburgh.

SCRAP, Gross Ton (including broker's commission)

No. 1 Heavy Melt. Pitts. ..	$45.00	$45.00	$45.00	$46.00	$20.00
No. 1 Heavy Melt. E. Pa. .	43.50	43.50	43.50	37.50	18.75
No. 1 Heavy Melt. Chicago.	43.50	43.50	43.50	38.50	18.75
No. 1 Heavy Melt. Valley..	45.00	45.00	45.00	46.25	20.00
No. 1 Heavy Melt. Cleve...	44.00	44.00	44.00	43.25	19.50
No. 1 Heavy Melt. Buffalo	44 00	44.00	44.00	39.75	19.25
Rails, Rerolling, Chicago..	52.50	52.50	52.50	56.50	22.25
No. 1 Cast, Chicago	49.00*	49.00*	49.00*	49.00	20.00

* F. o.b. shipping point.

COKE, Net Ton

Beehive, Furn. Connlsvl. ..	$14.75	$14.75	$14.75	$14.25	$8.75
Beehive, Fdry., Connlsvl. ..	17.50	17.50	17.50	15.50	8.625
Oven Frdy., Chicago	23.00	23.00	23.00	21.00	14.35

NONFERROUS METALS

Copper, del Conn.	24.50	24.50	24.50	22.50	14.375
Zinc, E. St. Louis	17.50	17.50	17.50	15.00	8.25
Lead, St. Louis	16.80	16.80	16.80	12.80	8.10
Tin, New York	103.00	103.00	106.00	101.00	52.00
Aluminum, del.	19.00	19.00	19.00	17.50	15.00
Antimony, Laredo, Tex. ..	42.00	42.00	42.00	24.50	14.50
Nickel, refinery, duty paid.	56.50	56.50	56.50	48.00	35.00

PIG IRON

F.o.b. furnace prices quoted under GCPR as reported to STEEL. Key to Minimum delivered prices do not include 3% federal tax. producing companies published on second following page.

PIG IRON, Gross Ton

	Basic	No. 2 Foundry	Malleable	Bessemer
Bethlehem, Pa. B2	$54.00	$54.50	$55.00	$55.50
Brooklyn, N.Y., del	....	58.69	59.46	....
Newark, del.	56.74	57.24	57.74	58.24
Philadelphia, del.	56.49	56.99	57.49	57.99
Birmingham District				
AlabamaCity, Ala. R2	48.38	48.88	....	....
Birmingham R2	48.38	48.88	....	....
Birmingham S9	48.38	48.88	....	....
Woodward, Ala. W15	48.38	48.88	....	....
Cincinnati, del.	....	55.33	....	....
Buffalo District				
Buffalo R2	52.00	52.50	53.00	....
Buffalo H1	52.00	52.50	53.00	....
Tonawanda, N.Y. W12	52.00	52.50	53.00	....
No. Tonawanda, N.Y. T9	....	52.50	53.00	....
Boston, del	61.63	62.13	62.63	....
Rochester, N.Y., del.	54.74	55.24	55.74	....
Syracuse, N.Y., del.	55.72	56.22	56.72	....
Chicago District				
Chicago I-3	52.00	52.50	52.50	53.00
Gary, Ind. U5	52.00	....	52.50	....
Indiana Harbor, Ind. I-2	52.00	....	52.50	....
So. Chicago, Ill. W14	52.00	52.50	52.50	....
So. Chicago, Ill. Y1	52.00	52.50	52.50	....
So. Chicago, Ill. U5	52.00	....	52.50	53.00
Milwaukee, del.	53.97	54.47	54.47	54.97
Muskegon, Mich., del.	....	58.20	58.20	....
Cleveland District				
Cleveland A7	52.00	52.50	52.50	53.00
Cleveland R2	52.00	52.50	52.50	....
Akron, del. from Cleve.	54.49	54.99	54.99	55.49
Lorain, O. N3	52.00	....	....	53.00
Duluth I-3	....	....	52.50	....
Erie, Pa. I-3	52.00	52.50	52.50	53.00
Everett, Mass. E1	....	55.25	55.75	....
Fontana, Calif. K1	58.00	58.50	....	....
Geneva, Utah G1	52.00	52.50	....	....
Seattle, Tacoma, Wash., del.	....	60.35	....	....
Portland, Oreg., del.	....	60.35	....	....
LosAngeles, SanFrancisco, del.	59.85	60.35	....	....
GraniteCity, Ill. G4	53.90	54.40	54.90	....
St. Louis, del. (inc. tax)	54.66	55.16	55.66	....
Ironton, Utah C11	52.00	52.50	....	....
LoneStar, Tex. L6	48.00	*48.50	48.50	....
Minnequa, Colo. C10	54.00	55.00	55.00	....
Pittsburgh District				
Neville Island, Pa. P6	....	52.50	52.50	53.00
Pitts., N. & S. sides, Ambridge, Aliquippa, del.	....	53.74	53.74	54.24
McKeesRocks, del.	....	53.49	53.49	53.99
Lawrenceville, Homestead, McKeesport, Monaca, del.	....	54.00	54.00	54.50
Verona, del.	....	54.48	54.48	54.98
Brackenridge, del.	....	54.72	54.72	55.22
Bessemer, Pa. U5	52.00	....	52.50	53.00
Clairton, Rankin, So. Duquesne, Pa. U5	52.00	....	....	....
McKeesport, Pa. N3	52.00	....	....	53.00
Monessen, Pa. P7	54.00	....	....	....
Sharpsville, Pa. S6	....	....	52.50	53.00
Steelton, Pa. B2	54.00	54.50	55.00	55.50
Swedeland, Pa. A3	56.00	56.50	57.00	57.50
Toledo, O. I-3	52.00	52.50	52.50	53.00
Cincinnati, del.	57.21	57.71	....	....
Troy, N.Y. R2	54.00	54.50	55.00	55.50
Youngstown District				
Hubbard, O. Y1	52.00	52.50	52.50	....
Youngstown Y1	52.00	52.50	52.50	....
Youngstown U5	52.00	....	....	53.00
Mansfield, O., del.	56.43	56.93	56.93	57.43

* Low phos, southern grade.

PIG IRON DIFFERENTIALS

Silicon: Add 50 cents per ton for each 0.25% Si over base grade, 1.75-2.25%, except on low phos iron on which base is 1.75-2.00%.

Phosphorus: Deduct 38 cents per ton for P content of 0.70% and over.

Manganese: Add 50 cents per ton for each 0.50% manganese over 1%, or portion thereof.

Nickel: Under 0.50% no extra; 0.50-0.74%, incl., add $2 per ton and each additional 0.25%, add $1 per ton.

BLAST FURNACE SILVERY IRON, Gross Ton

(Base 6.00-6.50% silicon; add $1.50 for each 0.5% Si)

Jackson, O. G2, J1	$62.50
Buffalo H1	63.73

ELECTRIC FURNACE SILVERY PIG IRON, Gross Ton

(Base 14.01-14.50% silicon; add $1 for each 0.5% Si to 18%; $1 for each 0.5% Mn over 1%; $1 for each 0.045% max. P)

NiagaraFalls, N.Y. P15	$58.00
Keokuk, Iowa, Openhearth & Fdry, frt. allowed K2	92.50
Keokuk, OH & Fdry., 12½ lb piglets, 16% Si, frt. allowed K2	95.50
Wenatchee, Wash., O.H. & Fdry., frt. allowed K2	92.50

CHARCOAL PIG IRON, Gross Ton

(Low phos semi-cold blast; differential charged for silicon over base grade; also for hard chilling iron Nos. 5 & 6)

Lyles, Tenn. T3	$68.00

LOW PHOSPHORUS PIG IRON, Gross Ton

Cleveland, intermediate, A7	$57.00
Steelton, Pa. B2	60.00
Philadelphia delivered	63.12
Troy, N.Y. R2	60.00

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Semifinished and Finished Steel Products

Mill prices quoted under GCPR as reported to STEEL, Aug. 23, 1951; cents per pound except as otherwise noted. Changes shown in italics. Code numbers following mill points indicate producing company; key on next two pages.

INGOTS, Carbon, Forging (NT)
Fontana,Calif. K1 ....$79.00
Munhall,Pa. U5 .....52.00

INGOTS, Alloy (NT)
Detroit R7 .....$54.00
Fontana,Calif. K1 ....80.00
Houston,Tex. S5 .....62.00
Midland,Pa. C18 .....54.00
Munhall,Pa. U5 .....54.00

BILLETS, BLOOMS & SLABS
Carbon, Rerolling (NT)
Bessemer,Pa. U5 ....$56.00
Clairton,Pa. U5 .....56.00
Ensley,Ala. T2 .....56.00
Fairfield,Ala. T2 .....56.00
Fontana,Calif. K1 ....75.00
Gary, Ind. U5 .....56.00
Johnstown,Pa. B2 .....56.00
Lackawanna,N.Y. B2..56.00
Munhall,Pa. U5 .....56.00
So.Chicago,Ill. U5 ....56.00
So.Duquesne,Pa. U5 ...56.00

Carbon, Forging (NT)
Bessemer,Pa. U5 ....$66.00
Buffalo R2 .....66.00
Canton,O. R2 .....66.00
Clairton,Pa. U5 .....66.00
Cleveland R2 .....66.00
Conshohocken,Pa. A3 ..73.00
Detroit R7 .....69.00
Ensley,Ala. T2 .....66.00
Fairfield, Ala. T2 .....66.00
Fontana,Calif. K1 ....85.00
Gary,Ind. U5 .....66.00
Geneva,Utah G1 .....66.00
Houston,Tex. S5 .....74.00
Johnstown,Pa. B2 .....66.00
Lackawanna,N.Y. B2 ..66.00
LosAngeles B3 .....85.00
Munhall,Pa. U5 .....66.00
Seattle B3 .....85.00
So.Chicago R2,U5,W14 ..66.00
So.Duquesne,Pa. U5 ...66.00
So.SanFrancisco B3 ...85.00

Alloy, Forging (NT)
Bethlehem,Pa. B2 ....$70.00
Buffalo R2 .....70.00
Canton,O. R2 .....70.00
Canton,O. (29) T7 ....66.00
Conshohocken,Pa. A3 ..77.00
Detroit R7 .....73.00
Fontana,Calif. K1 ....89.00
Gary,Ind. U5 .....70.00
Houston,Tex. S5 .....78.00
Ind.Harbor,Ind. Y1 ...70.00
Johnstown,Pa. B2 .....70.00
Lackawanna,N.Y. B2 ..70.00
LosAngeles B3 .....90.00
Massillon,O. R2 .....70.00
Midland,Pa. C18 .....70.00
Munhall,Pa. U5 .....70.00
So.Chicago R2,U5,W14 .70.00
So.Duquesne,Pa. U5 ...70.00
Struthers,O Y1 .....70.00
Warren,O. C17 .....70.00

ROUNDS, SEAMLESS TUBE (NT)
Canton,O. R2 .....$82.00
Cleveland R2 .....82.00
Fontana,Calif. K1 ....103.00
Gary,Ind. U5 .....82.00
Massillon,O. R2 .....82.00
So.Chicago,Ill. R2 ....82.00
So.Duquesne,Pa. U5 ...82.00

SHEET BARS (NT)
Fontana,Calif. K1 ...$89.00

SKELP
Aliquippa,Pa. J5 .....$3.45
Munhall,Pa. U5 .....3.35
Warren,O. R2 .....3.35
Youngstown, R2, U5 ....3.35

WIRE RODS
AlabamaCity,Ala. R2 ..4.10
Buffalo W12 .....4.10
Cleveland A7 .....4.10
Donora,Pa. A7 .....4.10
Fairfield,Ala. T2 .....4.10
Fontana,Calif. K1 ....4.90
Houston,Tex. S5 .....4.50
Johnstown,Pa. B2 .....4.10
Joliet,Ill. A7 .....4.10
LosAngeles B3 .....4.90
Minnequa,Colo. C10 ....4.35
Monessen,Pa. P7 .....4.30
No.Tonawanda,N.Y.B11 4.10
Pittsburg,Calif. C11 ....4.75
Portsmouth,O. P12 ....4.30
Roebling,N.J. R5 .....4.20
So.Chicago,Ill. R2 .....4.10
SparrowsPoint,Md. B2 ..4.20
Sterling,Ill.(1) N15 ....4.10
Struthers,O. Y1 .....4.10
Torrance,Calif. C11 ....4.90
Worcester,Mass. A7 ...4.40

SHEET STEEL PILING
Ind.Harbor,Ind. I-2 ....4.45
Lackawanna,N.Y. B2 ....4.45
Munhall,Pa. U5 .....4.45
So.Chicago,Ill. U5 .....4.45

STRUCTURALS
Carbon Steel Stand. Shapes
AlabamaCity,Ala. R2 ..3.60
Aliquippa,Pa. J5 .....3.65
Bessemer,Ala. T2 .....3.65
Bethlehem,Pa. B2 .....3.70
Clairton,Pa. U5 .....3.65
Fairfield,Ala. T2 .....3.65
Fontana,Calif. K1 ....4.25
Gary,Ind. U5 .....3.65
Geneva,Utah G1 .....3.65
Houston,Tex. S5 .....4.05
Ind.Harbor,Ind. I-2 ...3.65
Johnstown,Pa. B2 .....3.70
KansasCity,Mo. S5 ....4.25
Lackawanna,N.Y. B2 ..3.70
LosAngeles B3 .....4.25
Minnequa,Colo. C10 ....4.10
Munhall,Pa. U5 .....3.65
Niles,Calif.(22) P1 ....4.85
Phoenixville,Pa. P4 ....4.95
Portland,Oreg. O4 .....4.50
Seattle B3 .....4.30
So.Chicago,Ill. U5, W14.3.65
So.SanFrancisco B3 ....4.20
Torrance,Calif. C11 ....4.25
Weirton,W.Va. W6 .....3.90

Alloy Stand. Shapes
Clairton,Pa. U5 .....4.35
Fontana,Calif. K1 ....5.55
Munhall,Pa. U5 .....4.35
So.Chicago,Ill U5 .....4.35

H.S., L.A. Stand. Shapes
Aliquippa,Pa. J5 .....5.50
Bessemer,Ala. T2 .....5.50
Bethlehem,Pa.(14) B2 ..5.50
Clairton,Pa. U5 .....5.50
Fairfield,Ala. T2 .....5.50
Fontana,Calif. K1 ....6.10
Gary,Ind U5 .....5.50
Geneva,Utah G1 .....5.50
Ind.Harbor,Ind. I-2 ...5.50
Ind.Harbor,Ind. Y1 ....6.00
Johnstown,Pa. B2 .....5.50
Lackawanna,N.Y.(14)B2 5.50
LosAngeles B3 .....6.05
Munhall,Pa. U5 .....5.50
Seattle B3 .....6.10
So.Chicago,Ill. U5 .....5.50
So.SanFrancisco B3 ....6.00
Struthers,O. Y1 .....6.00

Wide Flange
Bethlehem,Pa. B2 .....3.70
Clairton,Pa. U5 .....3.65
Fontana,Calif. K1 ....4.65
Lackawanna,N.Y. B2 ..3.70
Munhall,Pa. U5 .....3.65
So.Chicago,Ill U5 .....3.65

H.S, L.A. Wide Flange
Bethlehem,Pa. B2 .....5.50
Lackawanna,N.Y. B2 ..5.50
Munhall,Pa. U5 .....5.45
So.Chicago,Ill. U5 .....5.45

BEARING PILES
Munhall,Pa. U5 .....3.65
So.Chicago,Ill. U5 .....3.65

PLATES,High-Strength Low-Alloy
Aliquippa,Pa. J5 .....5.65
Bessemer,Ala., T2 .....5.65
Clairton,Pa. U5 .....5.65
Cleveland J5, R2 .....5.65
Conshohocken,Pa. A3 ..5.90
Fairfield,Ala. T2 .....5.65
Fontana,Calif.(30) K1 ..6.25
Gary,Ind. U5 .....5.65
Geneva,Utah G1 .....5.65
Ind.Harbor,Ind. I-2 ...5.65
Ind.Harbor,Ind. Y1 ....6.15
Johnstown,Pa. B2 .....5.65
Munhall,Pa. U5 .....5.65
Pittsburgh J5 .....5.65
Seattle B3 .....6.55
Sharon,Pa. S3 .....5.70
So.Chicago,Ill. U5 .....5.65
SparrowsPoint,Md. B2 ..5.65
Warren,O. R2 .....5.65
Youngstown, Y1 .....6.15

PLATES, Open-Hearth Alloy
Claymont,Del. C22 ....4.85
Coatesville,Pa. L7 ....5.25
Conshohocken,Pa. A3 ..5.05
Fontana,Calif. K1 .....5.70
Gary,Ind. U5 .....4.75
Johnstown,Pa. B2 .....4.75
Munhall,Pa. U5 .....4.75
Sharon,Pa. S3 .....5.20
So.Chicago,Ill. U5 .....4.75
SparrowsPoint,Md. B2 ..4.75

FLOOR PLATES
Cleveland J5 .....4.75
Conshohocken,Pa. A3 ..4.75
Harrisburg,Pa. C5 .....5.95
Ind.Harbor,Ind. I-2 ....4.75
Munhall,Pa. U5 .....4.75
So.Chicago,Ill. U5 .....4.75

PLATES, Ingot Iron
Ashland,c.l.(15) A10 ...3.95
Ashland,lcl(15) A10 ....4.45
Cleveland,c.l. R2 .....4.30
Warren,O.,c.l. R2 .....4.30

PLATES, Carbon Steel
AlabamaCity,Ala. R2 ..3.70
Aliquippa,Pa. J5 .....3.70
Ashland,Ky.(15) A10 ..3.70
Bessemer,Ala. T2 .....3.70
Clairton,Pa. U5 .....3.70
Claymont,Del. C22 .....4.15
Cleveland J5, R2 .....3.70
Coatesville,Pa. L7 .....4.15
Conshohocken,Pa. A3 ..4.15
Fairfield,Ala. T2 .....3.70
Fontana,Calif.(30) K1.. 4.30
Gary,Ind. U5 .....3.70
GraniteCity,Ill. G4 .....4.40
Geneva,Utah G1 .....3.70
Harrisburg,Pa. C5 .....4.95
Houston,Tex. S5 .....4.10
Ind.Harbor,Ind. I-2, Y1.3.70
Johnstown,Pa. B2 .....3.70
Lackawanna,N.Y. B2 ..3.70
Minnequa,Colo. C10 ....4.50
Munhall,Pa. U5 .....3.70
Pittsburgh J5 .....3.70
Seattle B3 .....4.60
Sharon,Pa. S3 .....3.95
So.Chicago,Ill. U5, W14.3.70
SparrowsPoint,Md. B2 ..3.70
Steubenville,O. W10 ....3.70
Warren,O. R2 .....3.70
Weirton,W.Va. W6 .....4.00
Youngstown R2, U5, Y1.3.70

PLATES, Carbon A.R.
Fontana,Calif. K1 .....5.45
Geneva,Utah G1 .....4.85

PLATES, Wrought Iron
Economy,Pa. B14 .....8.60

BARS, Hot-Rolled Carbon
AlabamaCity,Ala. R2 ..3.70
Aliquippa,Pa. J5 .....3.70
Alton,Ill(1) L1 .....3.95
Atlanta,Ga. A11 .....4.25
Bessemer,Ala. T2 .....3.70
Buffalo R2 .....3.70
Canton,O. R2 .....3.70
Clairton,Pa. U5 .....3.70
Cleveland R2 .....3.70
Detroit R7 .....3.85
Emeryville, Calif. J7 ....4.45
Fairfield,Ala. T2 .....3.70
Fontana,Calif. K1 .....4.40
Gary,Ind. U5 .....3.70
Houston,Tex. S5 .....4.10
Ind.Harbor,Ind. I-2, Y1.3.70
Johnstown,Pa. B2 .....3.70
KansasCity,Mo. S5 ....4.30
Lackawanna,N.Y. B2 ..3.70
LosAngeles B3 .....4.40
Milton,Pa. B6 .....4.20
Minnequa,Colo. C10 ....4.15
Niles,Calif. P1 .....5.05
N.Tonawanda,N.Y. B11.3.70
Pittsburg,Calif. C11 ....4.40
Pittsburgh J5 .....3.70
Portland,Oreg. O4 .....4.65
Seattle B3, N14 .....4.45
So.Chicago R2,U5,W14 .3.70
So.Duquesne,Pa. U5 ....3.70
So.SanFran.,Cal. B3 ....4.45
Struthers,O. Y1 .....3.70
Torrance,Calif. C11 ....4.40
Weirton,W.Va. W6 .....3.85
Youngstown R2, U5 ....3.70

BAR SIZE ANGLES; S. SHAPES
Aliquippa,Pa. J5 .....3.70
Atlanta A11 .....4.25
Johnstown,Pa. B2 .....3.70
Lackawanna,N.Y. B2 ..3.70
Niles,Calif. P1 .....5.05
Portland,Oreg. O4 .....4.65
SanFrancisco S7 .....4.85

BAR SIZE ANGLES;H.R. CARBON
Bethlehem,Pa B2 .....3.90

BARS, Hot-Rolled Alloy
Bethlehem,Pa. B2 .....4.30
Buffalo R2 .....4.30
Canton,O. R2 .....4.30
Canton,O.(29) T7 .....3.95
Clairton,Pa. U5 .....4.30
Detroit R7 .....4.45
Ecorse,Mich. G5 .....4.65
Fontana,Calif. K1 .....5.35
Gary,Ind. U5 .....4.30
Houston,Tex. S5 .....4.70
Ind.Harbor,Ind. I-2, Y1.4.30
Johnstown,Pa. B2 .....4.30
Kansas,City,Mo. S5 ....4.90
Lackawanna,N.Y. B2 ..4.30
LosAngeles B3 .....5.35
Massillon,O. R2 .....4.30
Midland,Pa. C18 .....4.30
So.Chicago R2,U5,W14..4.30
S.Duquesne,Pa. U5 ....4.30
Struthers,O. Y1 .....4.30
Warren,O. C17 .....4.30
Youngstown U5 .....4.30

BAR SHAPES, Hot-Rolled Alloy
Clairton,Pa. U5 .....4.55
Gary, Ind. U5 .....4.55
Youngstown U5 .....4.55

BARS & SMALL SHAPES, H. R., High-Strength Low-Alloy
Aliquippa,Pa. J5 .....5.55
Bessemer,Ala. T2 .....5.55
Bethlehem,Pa. B2 .....5.55
Clairton,Pa. U5 .....5.55
Cleveland R2 .....5.55
Fairfield,Ala. T2 .....5.55
Fontana,Calif. K1 .....6.60
Gary,Ind. U5 .....5.55
Ind.Harbor,Ind. I-2 ....5.55
IndianaHarbor,Ind. Y1..6.05
Johnstown,Pa. B2 .....5.55
Lackawanna,N.Y. B2 ..5.55
LosAngeles B3 .....6.25
Pittsburgh J5 .....5.55
Seattle B3 .....6.30
So.Duquesne,Pa. U5 ....5.55
SoSanFrancisco B3 ....6.30
Struthers,O. Y1 .....6.05
Youngstown U5 .....5.55

BARS, Cold-Finished Carbon
Ambridge,Pa. W18 .....4.55
BeaverFalls,Pa. M12,R2.4.55
Buffalo B5 .....4.60
Camden,N.J. P13 .....5.00
Carnegie,Pa. C12 .....4.55
Chicago W18 .....4.55
Cleveland A7, C20 .....4.55
Detroit P17 .....4.70
Donora,Pa. A7 .....4.55
Elyria,O. W8 .....4.55
FranklinPark,Ill. N5 ....4.55
Gary,Ind, R2 .....4.55
GreenBay,Wis F7 .....4.55
Hammond,Ind. L2, M13.4.55
Hartford,Conn. R2 .....5.10
Harvey,Ill. B5 .....4.55
LosAngeles R2 .....6.00
Mansfield,Mass. B5 ....5.10
Massillon,O. R2, R8 ....4.55
Monaca,Pa. S17 .....4.55
Newark,N.J. W18 .....5.00
Plymouth,Mich. P5 ....4.80
Pittsburgh J5 .....4.55
Putnam,Conn. W18 ....5.10
Readville,Mass. C14 ....5.10
St.Louis,Mo. M5 .....4.95
So.Chicago,Ill. W14 ....4.55
SpringCity,Pa.(5) K3...5.00
Struthers,O. Y1 .....4.55
Waukegan,Ill. A7 .....4.55
Youngstown F3, Y1 ....4.55

BARS, Cold-Finished Alloy
Ambridge,Pa. W18 .....5.40
BeaverFalls,Pa. M12 ....5.40
Bethlehem,Pa. B2 .....5.40
Buffalo B5 .....5.40
Camden,N.J. P13 .....5.50
Canton,O. R2 .....5.40
Canton,O.(29) T7 .....4.90
Carnegie,Pa. C12 .....5.40
Chicago W18 .....5.40
Cleveland A7 .....5.45
Cleveland C20 .....5.40
Detroit P17 .....5.55
Donora,Pa. A7 .....5.45
Elyria,O. W8 .....5.40
Gary,Ind, R2 .....5.40
Hammond,Ind. L2, M13.5.40
Hartford,Conn. R2 ....5.85
Harvey,Ill B5 .....5.40
Lackawanna,N.Y. B2 ...5.40
Mansfield,Mass. B5 ....5.85
Massillon,O. R2,R8 .....5.40
Midland,Pa. C18 .....5.40
Monaca,Pa. S17 .....5.40
Newark,N.J. W18 .....5.75
Plymouth,Mich. P5 ....5.60
So.Chicago,Ill. R2, W14.5.40
Struthers,O. Y1 .....5.40
Warren,O. C17 .....5.40
Waukegan,Ill. A7 .....5.45
Worcester,Mass. A7 ....5.75
Youngstown F3, Y1 .....5.40

RAIL STEEL BARS
ChicagoHts.(3,4) C2 ....4.75
ChicagoHts.(3,4) I-2 ....4.50
Franklin,Pa.(3,4) F5 ....4.75
FortWorth,Tex.(26) T4..4.85
Huntngtn,W.Va.(3) W7..5.50
Marion,O.(3) P11 .....4.75
Moline,Ill.(3) R2 .....3.80
Tonawanda (3,4) B12 ....4.75
Williamsport(3) S19 ....5.00
Williamsport(4) S19 ....5.10

BARS, Wrought Iron
Dover,N.J.(Staybolt)U1 15.00
Dover,(Eng.Bolt) U1 ..13.50
Dover(Wrgt.Iron) U1 ..12.25
Economy,Pa.(S.R.) B14..9.60
Economy,Pa.(D.R.)B14 11.90
Economy,(Staybolt)B14 12.20
McK.Rks.(Staybolt) L5..14.50
McK.Rks.(S.R.) L5 ....9.60
McK.Rks.(D.R.) L5 ...13.00

BARS ,Reinforcing (Fabricators)
AlabamaCity,Ala. R2.. 3.70
Alton,Ill.(6) L1 .....3.70
Atlanta A11 .....4.25
Buffalo R2 .....3.70
Cleveland R2 .....3.70
Emeryville,Calif. J7 ....4.45
Fairfield,Ala. T2 .....3.70
Fontana,Calif. K1 .....4.40
Gary,Ind. U5 .....3.70
Houston,Tex. S5 .....4.10
Ind.Harbor,Ind. I-2, Y1..3.70
Johnstown,Pa. B2 .....3.70
KansasCity,Mo. S5 ....4.30
Lackawanna,N.Y. B2 ..3.70
LosAngeles B3 .....4.40
Milton,Pa. B6 .....4.20
Minnequa,Colo. C10 ....4.15
Niles,Calif. P1 .....5.05
No.Tonawanda,N.Y. B11..3.70
Pittsburg,Calif. C11 ....4.40
Pittsburgh J5 .....3.70
Portland,Oreg. O4 .....4.65
Seattle B3, N14 .....4.45
So.Chicago R2,U5,W14 ..3.70
So.Duquesne,Pa. U5 ....3.70
So.SanFran.,Cal. B3 ....4.45
Struthers,O. Y1 .....3.70
Torrance,Calif. C11 ....4.40
Warren,O. R2 .....3.70
Weirton,W.Va. W6 .....3.85
Youngstown R2, U5 ....3.70

BARS, Reinforcing (Mills)
Buffalo R2 .....3.70
Cleveland R2 .....3.70
Emeryville,Calif. J7 ....4.45
Fairfield,Ala. T2 .....3.70
Fontana,Calif. K1 .....4.40
Gary,Ind. U5 .....3.70
Houston,Tex. S5 .....4.10
Ind.Harbor,Ind. I-2, Y1..3.70
Johnstown,Pa. B2 .....3.70
KansasCity,Mo. S5 ....4.30
Lackawanna,N.Y. B2 ..3.70
LosAngeles B3 .....4.40
Milton,Pa. B6 .....4.20
Minnequa,Colo. C10 ....4.15
Niles,Calif. P1 .....5.05
Pittsburg,Calif. C11 ....4.40
Pittsburgh J5 .....3.70
Portland,Oreg. O4 .....4.65
Seattle B3, N14 .....4.45
So.Chicago R2,U5,W14 ..3.70
So.Duquesne,Pa. U5 ....3.70
So.SanFrancisco B3 ....4.45
Struthers,O. Y1 .....3.70
Torrance,Calif. C11 ....4.40
Warren,O. R2 .....3.70
Weirton,W.Va. W6 .....3.85
Youngstown R2, U5 ....3.70

BARS, Reinforcing
(Fabricated; to Consumers)
Huntington,W.Va. W7 ..5.50
Johnstown, ¼-1" B2 ...4.75
LosAngeles B3 .....5.45
Marion,O. P11 .....5.00
Seattle B3, N14 .....5.55
So.SanFrancisco B3 ....5.45
SparrowsPt. ¼-1" B2 ..4.75
Williamsport,Pa. S19 ..5.10

SHEETS, Hot-Rolled Steel
(18 gage and heavier)
AlabamaCity,Ala. R2 ..3.60
Ashland,Ky.(8) A10 ....3.60
Butler,Pa. A10 .....3.60
Cleveland J5, R2 .....3.60
Conshohocken,Pa. A3 ..4.00
Detroit M1 .....4.40
Ecorse,Mich.(8) G5 ....3.80
Fairfield,Ala. T2 .....3.60
Fontana,Calif, K1 .....4.55
Gary,Ind, U5 .....3.60
Geneva,Utah G1 .....3.70
GraniteCity,Ill. G4 ....4.30
Ind.Harbor,Ind. I-2, Y1..3.60
Irvin,Pa. U5 .....3.60
Lackawanna,N.Y. B2 ..3.60
Munhall,Pa. U5 .....3.60
Niles,O. N12 .....5.25
Pittsburg,Calif. C11 ....4.30
Pittsburgh J5 .....3.60
Sharon,Pa. S3 .....4.00
So.Chicago,Ill. W14 ....3.60
SparrowsPoint,Md. B2 ..3.60
Steubenville,O. W10 ....3.60
Torrance,Calif. C11 ....4.30
Warren,O. R2 .....3.60
Weirton,W.Va. W6 .....3.60
WestLeechburg,Pa. A4..3.75
Youngstown U5, Y1 ....3.60

SHEETS, H.R., (19 gage)
AlabamaCity,Ala. R2 ..4.75
Dover,O. R1 .....5.65
Ind.Harbor,Ind. I-2 ....5.40
Mansfield,O. E6 .....5.65
Niles,O. N12 .....5.75
Torrance,Calif. C11 ....5.40

SHEETS, H.R. (14-ga., heavier)
High-Strength Low-Alloy
Cleveland J5, R2 .....5.40
Conshohocken,Pa. A3 ..5.65
Ecorse,Mich.G5 .....5.95
Fairfield,Ala T2 .....5.40
Fontana,Calif. K1 .....6.35
Gary,Ind. U5 .....5.40
Ind.Harbor,Ind. I-2 ....5.40
IndianaHarbor,Ind. Y1..5.90
Irvin,Pa. U5 .....5.40
Lackawanna(35) B2 ....5.40
Pittsburgh J5 .....5.40
Sharon,Pa. S3 .....5.40
So.Chicago,Ill. U5 .....5.40
SparrowsPoint(36) B2 ..5.40
Warren,O. R2 .....5.40
Weirton,W.Va. W6 .....5.75
Youngstown U5 .....5.40
Youngstown Y1 .....5.90

SHEETS, Cold-Rolled
High-Strength Low-Alloy
Cleveland J5, R2 .....6.55
Ecorse,Mich. G5 .....7.10
Fontana,Calif. K1 .....7.50
Gary,Ind. U5 .....6.55
IndianaHarbor,Ind. Y1..7.05
IndianaHarbor,Ind. I-2..6.55
Irvin,Pa. U5 .....6.55
Lackawanna(37) B2 ....6.55
Pittsburgh J5 .....6.55
SparrowsPoint(38) B2 ..6.55
Warren,O. R2 .....6.55
Weirton,W.Va. W6 .....6.90
Youngstown Y1 .....7.05

SHEETS, Cold-Rolled Steel (Commercial Quality)

Butler,Pa. A10 .....4.35
Cleveland J5, R2 .....4.35
Ecorse,Mich. G5 .....4.55
Fairfield,Ala. T2 .....4.35
Follansbee,W.Va. F4 ...5.35
Fontana,Calif. K1 .....5.30
Gary,Ind. U5 .....4.35
GraniteCity,Ill. G4 .....5.05
Ind.Harbor,Ind. I-2, Y1.4.35
Irvin,Pa. U5 .....4.35
Lackawanna,N.Y. B2 ..4.35
Middletown,O. A10 ....4.35
Pittsburg,Calif. C11 ....5.30
Pittsburgh J5 .....4.35
SparrowsPoint,Md. B2 ..4.35
Steubenville,O. W10 ....4.35
Warren,O. R2 .....4.35
Weirton,W.Va. W6 ....4.35
Youngstown Y1 .....4.35

SHEETS, Galv'd No. 10 Steel

AlabamaCity,Ala., R2 ..4.80
Ashland,Ky.(8) A10 ....4.80
Canton,O. R2 .....4.80
Dover,O. R1 .....5.50
Fairfield,Ala. T2 .....4.80
Gary,Ind. U5 .....4.80
GraniteCity,Ill. G4 ....5.50
Ind.Harbor,Ind. I-2 ....4.80
Irvin,Pa. U5 .....4.80
Kokomo,Ind.(13) C16 ..5.20
MartinsFerry,O. W10 ..4.80
Niles,O. N12 .....6.00
Pittsburg,Calif. C11 ....5.55
SparrowsPoint,Md. B2 ..4.80
Steubenville,O. W10 ....4.80
Torrance,Calif. C11 ....5.55
Weirton,W.Va. W6 ....4.80

SHEETS, Galvanized No. 10, High-Strength Low-Alloy

Irvin,Pa. U5 .....7.20
SparrowsPoint(39) B2 ..6.75

SHEETS, Galvannealed Steel

Canton,O. R2 .....5.35
Irvin,Pa. U5 .....5.35
Kokomo,Ind.(13) C16 ..5.75
Niles,O. N12 .....6.55

SHEETS, ZINCGRIP Steel No. 10

Butler,Pa. A10 .....5.05
Middletown,O. A10 ....5.05

SHEETS, Electro Galvanized

Cleveland R2 (28) 5.65
Niles,O. R2 (28) 5.65
Weirton,W.Va. W6 ....5.50

SHEETS, Zinc Alloy

Ind.Harbor,Ind. I-2 ....5.70

SHEETS, Drum Body

PittsburgCalif. C11 ....4.30
TorranceCalif. C11 ....4.30

SHEETS, Well Casing

Fontana,Calif. K1 .....5.10
Torrance,Calif. C11 ....5.10

BLUED Stock, 29 ga.

Yorkville,O. W10 .....6.80
Follansbee,W.Va.(23)F4 6.85

ROOFING SHORT TERNES (8 lb. Coated)

Gary,Ind. U5 .....9.50

MANUFACTURING TERNES (Special Coated)

Fairfield,Ala. T2 .....$7.60
Gary,Ind. U5 .....7.50
Irvin,Pa. U5 .....7.50
SparrowsPoint,Md. B2 ..7.60
Yorkville,O. W10 .....7.50

SHEETS, LT. Coated Ternes, 6 lb

Yorkville,O. W10 .....$8.40

SHEETS, Mfg. Ternes, 8 lb (Commercial Quality)

Gary,Ind. U5 .....$9.50
Yorkville,O. W10 .....9.50

SHEETS, Long Terne Steel (Commercial Quality)

BeechBottom,W.Va.W10 5.20
Gary,Ind. U5 .....5.20
Mansfield,O. E6 .....6.05
Middletown,O. A10 ....5.20
Niles,O. N12 .....6.00
Weirton,W.Va. W6 ....5.20

SHEETS, Long Terne, Ingot Iron

Middletown,O. A10 ....5.60

SHEETS, Enameling Iron

Ashland,Ky.(8) A10 ....4.65
Cleveland R2 .....4.65
Gary,Ind. U5 .....4.65
GraniteCity,Ill. G4 .....5.35
Ind.Harbor,Ind. I-2 ....4.65
Irvin,Pa. U5 .....4.65
Middletown,O. A10 ....4.65
Youngstown Y1 .....4.65

SHEETS, Culvert No. 16	Cu Alloy	Cu Fe
Ashland,Ky. .A10	5.60	...
Canton,O. R2 ...	5.65	6.10
Fairfield,Ala. T2.	5.60	5.85
Gary U5	5.60	5.85
IndianaHarbor I-2	5.60	5.85
Irvin,Pa. U5	5.60	5.85
Kokomo,Ind. C16	6.25	...
MartinsFy.O. W10	5.60	5.85
Pittsburg,Cal. C11	6.35	...
SparrowsPt B2..	5.60	...
Torrance,Cal. C11	6.35	...

SHEETS, Culvert, No. 16 Pure Iron

Ashland,Ky. A10 .....5.85
Fairfield,Ala T2 .....5.85

SHEETS, Hot-Rolled Ingot Iron 18 Gage and Heavier

Ashland,Ky.(8) A10 ....3.85
Cleveland R2 .....4.20
Ind.Harbor,Ind. I-2 ....3.85
Warren,O. R2 .....4.20

SHEETS, Cold-Rolled Ingot Iron

Cleveland R2 .....4.95
Middletown,O. A10 ....4.85
Warren,O. R2 .....4.95

SHEETS, Galvanized Ingot Iron No. 10 flat

Ashland,Ky.(8) A10 ....5.05
Canton,O. R2 .....5.55

SHEETS, ZINCGRIP Ingot Iron

Butler,Pa. A10 .....5.30
Middletown,O. A10 ....5.30

SHEETS, ALUMINIZED

Butler,Pa. A10 .....8.15

TIN PLATE, American Coke (Base Box)

	1.25 lb	1.50 lb
Aliquippa J5	$8.45	$8.70
Fairfield,Ala. T2.	8.55	8.80
Gary, Ind. U5 ..	8.45	8.70
Ind.Har. I-2, Y1.	8.45	8.70
Irvin,Pa. U5	8.45	8.70
Pitts.,Cal. C11 ..	9.20	9.45
Sp.Pt.,Md. B2 ...	8.55	8.80
Warren,O. R2 ..	8.45	8.70
Weirton,W.Va. W6	8.45	8.70
Yorkville,O. W10.	8.45	8.70

BLACK PLATE (Base Box)

Aliquippa,Pa. J5 .....$6.25
Fairfield,Ala. T2 .....6.35
Gary,Ind. U5 .....6.25
GraniteCity,Ill. G4 .....6.45
Ind.Harbor,Ind. I-2, Y1.6.25
Irvin,Pa. U5 .....6.25
Niles,O. R2 .....6.25
PittsburgCalif. C11 ...7.00
SparrowsPoint,Md. B2...6.35
Warren,O. R2 .....6.25
Weirton,W.Va. W6 ....6.25
Yorkville,O. W10 .....6.25

HOLLOWARE ENAMELING Black Plate (29 gage)

Follansbee,W.Va. F4 ...5.85
Gary,Ind. U5 .....5.85
GraniteCity,Ill. G4 ....6.05
Ind.Harbor,Ind. Y1 ....5.30
Irvin,Pa. U5 .....5.85
Yorkville,O. W10 .....6.15

STRIP, Hot-Rolled Alloy

Bridgprt,Conn.(10) S15..5.45
Carnegie,Pa. S18 .....5.85
Fontana,Calif. K1 .....6.70
Gary,Ind. U5 .....5.50
Houston,Tex. S5 .....5.90
KansasCity,Mo. S5 ....6.10
Midland,Pa. C18 .....5.85
NewBritn,Conn.(10) S15.5.45
Sharon,Pa. S8 .....5.85
Youngstown U5 .....5.50

STRIP, Hot-Rolled, High-Strength Low-Alloy

Bessemer,Ala. T2 .....5.30
Conshohocken,Pa. A3 ..5.55
Ecorse,Mich. G5 .....5.95
Fairfield,Ala. T2 .....5.30
Fontana,Calif. K1 .....6.20
Gary,Ind. U5 .....5.30
Ind.Harb.,Ind. I-2 ....5.30
IndianaHarbor,Ind. Y1..5.80
Lackawanna,N.Y. B2 ...4.95
LosAngeles(25) B3 ....6.05
Seattle B3 .....6.30
Sharon,Pa. S3 .....5.40
So.SanFrancisco(25) B3.6.05
SparrowsPoint,Md. B2 ..4.95
Warren,O. R2 .....5.30
Weirton,W.Va. W6 ....5.75
Youngstown Y1 .....5.80
Youngstown U5 .....5.30

STRIP, Cold-Rolled, High-Strength Low-Alloy

Cleveland J5 .....6.70
Cleveland A7 .....6.55
Dover,O. G6 .....7.30
Fontana,Calif. K1 .....6.95
Lackawanna,N.Y. B2 ..6.40
Sharon,Pa. S3 .....6.55
SparrowsPoint,Md. B2 ..6.40
Warren,O. R2 .....6.55
Weirton,W.Va. W6 ....7.20
Youngstown Y1 .....7.05

STRIP, Hot-Rolled Carbon

Ala.City,Ala.(27) R2 ...3.50
Alton,Ill.(1) L1 .....3.75
Ashland,Ky.(8) A10 ...3.50
Atlanta A11 .....4.00
Bessemer,Ala. T2 .....3.50
Bridgeprt,Conn.(10) S15.4.00
Buffalo(27) R2 .....3.50
Butler,Pa. A10 .....3.50
Carnegie,Pa. S18 .....4.00
Conshohocken,Pa. A3 ..3.90
Detroit M1 .....4.40
Ecorse,Mich. G5 .....3.80
Fairfield,Ala. T2 .....3.50
Fontana,Calif. K1 .....4.75
Gary,Ind. U5 .....3.50
Houston,Tex. S5 .....4.90
Ind.Harbor,Ind. I-2, Y1.3.50
Johnstown,Pa.(25) B2 ..3.50
KansasCity,Mo.(9) S5 ..4.10
Lackawanna,N.Y.(32)B2 3.50
LosAngeles B3 .....4.25
Milton,Pa. B6 .....4.00
Minnequa,Colo. C10 ....4.55
NewBritain(10) S15 ....4.00
No.Tonawanda,N.Y. B11.3.50
Pittsburg,Calif. C11 ....4.25
Riverdale,Ill. A1 .....3.50
SanFrancisco S7 .....4.85
Seattle B3, N14 .....4.50
Sharon,Pa. S3 .....4.00
So.Chicago,Ill. W14 ...3.50
So.SanFrancisco B3 ....4.25
SparrowsPoint,Md. B2..3.50
Torrance,Calif. C11 ....4.25
Warren,O. R2 .....3.50
Weirton,W.Va. W6 ....3.60
WestLeechburg,Pa. A4..3.75
Youngstown U5, Y1 ...3.50

STRIP, Cold-Rolled Alloy Steel

Bridgeprt,Conn.(10)S15 10.75
Carnegie,Pa. S18 .....10.60
Cleveland A7 .....10.00
Dover,O. G6 .....10.50
Fontana,Calif. K1 ....11.65
Harrison,N.J. C18 ....10.60
Midland,Pa. C18 .....10.60
NewBritn,Conn.(10)S15 10.75
Pawtucket,R.I. (11) N8.10.75
Pawtucket,R.I.(12) N8.11.05
Sharon,Pa. S3 .....10.60
Worcester,Mass. A7 ...10.30
Youngstown C8 .....10.60

STRIP, Cold-Rolled Carbon

Anderson,Ind.(40) G6 ..5.50
Berea,O. C7 .....6.00
Bridgprt,Conn.(10) S15..5.35
Butler,Pa. A10 .....4.65
Cleveland A7, J5 .....4.65
Dearborn,Mich. D3 ....5.00
Detroit D2 .....5.00
Detroit M1 .....5.45
Dover,O.(40) G6 .....5.50
Ecorse,Mich. G5 .....4.85
Follansbee,W.Va. F4 ...5.35
Fontana,Calif. K1 .....6.30
FranklinPark,Ill.(40)T6 4.90
Ind.Harbor,Ind. I-2 ....4.90
Lackawanna,N.Y. B2 ...4.65
LosAngeles C1 .....6.40
Mattapan,Mass. T6 ....5.50
Middletown,O. A10 ....4.65
NewBritain(10) S15 ....5.35
NewCastle,Pa. B4 .....5.25
NewCastle(40) E5 .....5.25
NewHaven,Conn. D2 ...5.55
NewHaven,Conn. A7 ...5.15
Pawtucket,R.I. R3 ....6.00
Pawtucket,R.I.(21) N8..5.55
Riverdale,Ill.(40) A1 ..4.90
Rome,N.Y. R6 .....5.10
Sharon,Pa. S3 .....5.35
SparrowsPoint,Md. B2 ..4.65
Trenton,N.J. R5 .....6.00
Wallingford,Conn. W2 ...5.55
Warren,O.(40) T5 .....5.25
Warren,O. R2 .....4.65
Weirton,W.Va. W6 ....4.65
Youngstown C8 (40) ...5.25
Youngstown Y1 .....4.65

STRIP, Electro Galvanized

Dover,O. G6 .....5.50
Warren,O. T5 .....5.25
Weirton,W.Va. W6 ....4.65
Youngstown C8 .....5.25

STRIP, Cold-Finished Spring Steel (Annealed)	0.26-0.40C	0.41-0.60C	0.61-0.80C	0.81-1.05C	1.06-1.35C
Berea,O. C7	...	6.80	7.40	9.35	11.65
Bridgeport,Conn.(10) S15	5.35	6.80	7.40	9.35	11.65
Bristol,Conn. W1	...	...	7.70	9.65	....
Carnegie,Pa. S18	...	6.80	7.40	9.35	11.65
Cleveland A7	4.65	6.45	7.40	9.35	11.65
Dearborn,Mich. D3	5.60	7.05	7.65	...	....
Detroit D2	5.60	6.65	7.25	...	....
Dover,O. G6	5.50	6.80	7.40	9.35	11.65
FranklinPark,Ill. T6 ..	5.00	6.60	7.55	9.50	11.80
Harrison,N.J. C18	...	...	7.70	9.65	11.95
Mattapan,Mass. T6	5.50	6.75	7.70	9.65	11.95
NewBritn.,Con.(10) S15	5.35	6.80	7.40	9.35	11.65
NewCaste,Pa. B4	5.35	6.80	7.40	9.35	....
NewCastle,Pa. E5	5.50	6.80	7.40	9.35	11.65
NewHaven,Conn. D2 ..	5.85	6.75	7.35	...	....
NewYork W3	...	7.10	7.70	9.65	11.95
Pawtucket,R.I. N8: Cleve.orPitts.Base	...	6.80	7.40	9.35	11.65
Worcester,Mass.,Base .	5.85	7.10	7.70	9.65	11.95
Sharon,Pa. S3	5.35	6.80	7.40	9.35	11.65
Trenton,N.J. R5	...	7.10	7.70	9.65	11.95
Wallingford,Conn. W2..	5.85	6.75	7.35	9.30	11.60
Weirton,W.Va. W6	5.35	6.80	7.40	9.35	11.65
Worcester,Mass. A7	4.95	6.75	7.70	9.65	11.95
Worcester,Mass. T6	5.50	6.75	7.70	9.65	11.95
Youngstown C8	...	6.80	7.40	9.35	11.65
Spring Steel (Tempered)					
Trenton,N.J. R5	...	...	10.30	12.50	15.35
Harrison,N.J. C18	...	...	10.30	12.50	15.35
NewYork W3	...	...	10.30	12.50	15.35

TIN PLATE, Electrolytic (Base Box)	0.25-lb	0.50 lb	0.75lb
Aliquippa,Pa J5	$7.15	$7.40	$7.80
Fairfield,Ala. T2	7.25	7.50	7.90
Gary,Ind U5	7.15	7.40	7.80
GraniteCity,Ill. G4	7.35	7.60	8.00
Ind.Harbor,Ind. I-2, Y1	7.15	7.40	7.80
Irvin,Pa. U5	7.15	7.40	7.80
Niles,O. R2	7.15	7.40	7.80
Pittsburg,Calif. C11	7.90	8.15	8.55
SparrowsPoint,Md. B2	7.25	7.50	7.90
Weirton,W.Va. W6	7.15	7.40	7.80
Yorkville,O. W10	7.15	7.40	780.

SHEETS, SILICON, H.R. or C.R.(22 Ga.) COILS (Cut Lengths ½c lower)	Field	Armature	Electric	Motor	Dynamo
BeechBottom W10 (cut-lengths)	...	...	7.25	8.50	9.30
Brackenridge,Pa. A4	...	...	7.75	9.00	9.80
GraniteCity,Ill.G4 (cut lengths)	...	...	7.95	9.20	...
Ind.Harbor,Ind. I-2	6.95	7.25	(34)	...	...
Mansfield,O. E6 (cut lengths).	7.10	7.25	7.75	9.00	9.80
Niles,O. N12 (cut lengths)....	...	6.75	7.25	...	...
Vandergrift,Pa. U5	...	7.25	7.75	9.00	9.80
Warren,O. R2	6.95	7.25	7.75	9.00	9.80
Zanesville,O. A10	...	7.25	7.75	9.00	9.80

SHEETS, SILICON (22 Ga. Base) Coils (Cut Lengths ½c lower) Transformer Grade	72	65	58	52
BeechBottom W10 (cut lengths)	9.85	10.40	11.10	11.90
Brackenridge,Pa. A4	10.35	....	....	....
Vandergrift,Pa. U5	10.35	10.90	11.60	12.40
Warren,O. R2	10.35	....	....	....
Zanesville,O. A10	10.35	10.90	11.60	12.40

H.R. or C.R. COILS AND CUT LENGTHS, SILICON (22 Ga.)	T-100	T-90	T-80	T-73
Butler,Pa. A10 (C.R.)	....	....	14.75	15.25
Vandergrift,Pa. U5	12.90	13.75	14.75	15.25

Key to Producers

A1 Acme Steel Co.
A3 Alan Wood Steel Co.
A4 Allegheny Ludum Steel
A7 American Steel & Wire
A8 Anchor Drawn Steel Co.
A9 Angell Nail & Chaplet
A10 Armco Steel Corp.
A11 Atlantic Steel Co.
A13 American Cladmetals Co.

B1 Babcock & Wilcox Tube
B2 Bethlehem Steel Co.
B3 Beth. Pac. Coast Steel
B4 Blair Strip Steel Co.
B5 Bliss & Laughlin Inc.
B6 Boiardi Steel Corp.
B8 Braeburn Alloy Steel
B11 Buffalo Bolt Co.
B12 Buffalo Steel Co.
B14 A. M. Byers Co.

C1 Calstrip Steel Corp.
C2 Calumet Steel Div. Borg-Warner Corp.
C4 Carpenter Steel Co.
C5 Central Iron & Steel Div. Barium Steel Corp.
C7 Cleve. Cold Rolling Mills
C8 Cold Metal Products Co.
C9 Colonial Steel Co.
C10 Colorado Fuel & Iron
C11 Columbia Steel Co.
C12 Columbia Steel & Shaft
C13 Columbia Tool Steel Co.
C14 Compressed Steel Shaft
C16 Continental Steel Corp.
C17 Copperweld Steel Co.
C18 Crucible Steel Co.
C19 Cumberland Steel Co.
C20 Cuyahoga Steel & Wire
C22 Claymont Steel Corp.

D2 Detroit Steel Corp.
D3 Detroit Tube & Steel
D4 Disston & Sons, Henry
D6 Driver Harris Co.
D7 Dickson Weatherproof Nail Co.

E1 Eastern Gas&Fuel Assoc.
E2 Eastern Stainless Steel
E4 Electro Metallurgical Co.
E5 Elliott Bros. Steel Co.
E6 Empire Steel Corp.

F2 Firth Sterling Steel
F3 Fitzsimons Steel Co.
F4 Follansbee Steel Corp.
F5 Franklin Steel Div.
Borg-Warner Corp.
F6 Fretz-Moon Tube Co.
F7 Ft. Howard Steel & Wire

G1 Geneva Steel Co.
G2 Globe Iron Co.
G3 Globe Steel Tubes Co.
G4 Granite City Steel Co.
G5 Great Lakes Steel Corp.
G6 Greer Steel Co.

H1 Hanna Furnace Corp.

I-1 Igoe Bros. Inc.
I-2 Inland Steel Co.
I-3 Interlake Iron Corp.
I-4 Ingersoll Steel Div., Borg-Warner Corp.

J1 Jackson Iron & Steel Co.
J3 Jessop Steel Co.
J4 Johnson Steel & Wire Co.
J5 Jones & Laughlin Steel
J6 Joslyn Mfg. & Supply
J7 Judson Steel Corp.
J8 Jersey Shore Steel Co.

K1 Kaiser Steel Corp.
K2 Keokuk Electro Metals
K3 Keystone Drawn Steel
K4 Keystone Steel & Wire

L1 Laclede Steel Co.
L2 LaSalle Steel Co.
L3 Latrobe Electric Steel
L5 Lockhart Iron & Steel
L6 Lone Star Steel Co.
L7 Lukens Steel Co.

STRIP, Hot-Rolled Ingot Iron

Ashland,Ky. (8) A10	3.75
Warren,O. R2	4.10

STRIP, Cold-Rolled Ingot Iron

Warren,O. R2	5.25

TIGHT COOPERAGE HOOP

Atlanta A11	4.05
Riverdale,Ill. A1	3.90
Sharon, Pa. S3	4.15
Youngstown U5	3.75

WIRE, Merchant Quality

(6 to 8 gage)	An'ld	Galv.
Alabama City R2	5.70	5.95
Aliquippa J5	5.70	6.15
Atlanta A11	5.95	6.40
Bartonville(19) K4	5.70	6.15
Buffalo W12	4.85	...
Cleveland A7	5.70	6.15
Crawfordsville M8	5.95	6.40
Donora,Pa. A7	5.70	6.15
Duluth,Minn. A7	5.70	6.15
Fairfield T2	5.70	6.15
Houston, Tex. S5	6.10	6.55
Johnstown B2	5.70	6.15
Joliet, Ill. A7	5.70	6.15
KansasCy,Mo. S5	6.30	6.75
Kokomo C16	5.80	6.05
LosAngeles B3	6.65	...
Minnequa C10	5.95	6.45
Monessen P7	5.95	6.40
Palmer W12	5.15	...
Pitts,Calif. C11	6.65	6.80
Prtsmth.(18)P12	6.10	6.60
Rankin A7	5.70	6.15
So.Chicago R2	5.70	5.95
So.S.Fran. C10	6.65	7.10
SparrowsPt. B2	5.80	6.25
Sterling,Ill.(1)N15	5.70	6.15
Struthers,O. Y1	5.70	6.15
Torrance,Cal. C11	6.65	...
Worcester A7	6.00	6.45

WIRE (16 gage)	An'ld	Galv. Stone
Aliquippa J5	10.15	12.15
Bartonville(1) K4	10.25	11.95
Cleveland A7	10.25	12.15
Crawfrdsville M8	10.30	12.00
Fostoria,O. S1	10.40	13.00
Johnstown B2	10.25	12.15
Kokomo C16	10.25	11.95
Minnequa C10	10.40	12.40
Palmer,Mass.C12	10.25	12.15
Pitts.Cal. C11	10.60	12.50
Prtsmth.(18) P12	10.55	12.30
SparrowsPt. B2	10.35	12.25
Waukegan A7	10.25	12.15

ROPE WIRE	(A)	(B)
Bartonville,Ill. K4	8.55	8.80
Buffalo W12	8.55	8.80
Fostoria,O. S1	8.85	9.10
Johnstown,Pa. B2	8.55	8.80
Monessen,Pa. P16	8.55	8.80
Monessen,Pa. P7	8.80	9.05
Palmer,Mass. W12	8.85	9.10
Portsmouth,O. P12	8.55	8.80
Roebling,N.J., R5.	8.85	9.10
SparrowsPt. B2	8.65	8.90
Struthers,O. Y1	8.55	8.80
Worcester J4, T6.	8.85	9.10

(A) Plow and Mild Plow.
(B) Improved Plow.

WIRE, Manufacturers Bright, Low Carbon

AlabamaCity,Ala. R2	4.85
Aliquippa,Pa. J5	4.85
Atlanta A11	5.10
Alton,Ill.(1) L1	4.85
Bartonville,Ill.(1) K4	4.85
Buffalo W12	4.85
Chicago W13	5.10
Cleveland A7, C20	4.85
Crawfordsville,Ind. M8.	5.10
Donora,Pa. A7	4.85
Duluth,Pa. A7	4.85
Fairfield,Ala. T2	4.85
Fostoria,O.(24) S1	5.35
Houston S5	5.25
Johnstown,Pa. B2	4.85
Joliet, Ill. A7	4.85
KansasCity, Mo. S5	5.45
Kokomo,Ind. C16	4.95
Los Angeles B3	5.80
Minnequa,Colo. C10	5.10
Monessen,Pa. P7	5.10
Newark, 6-8 ga. I-1	5.50
No.Tonawanda B11	4.85
Palmer, Mass. W12	5.15
Pittsburg,Calif. C11	5.80
Portsmouth,O. P12	5.25
Rankin,Pa. A7	4.85
So.Chicago,Ill. R2	4.85
So.SanFrancisco C10	5.80
SparrowsPoint,Md. B2	4.95
Sterling,Ill.(1) N15	4.85
Struthers,O. Y1	4.85
Torrance,Calif. C11	5.80
Waukegan,Ill. A7	4.85
Worcester,Mass. A7, T6.	5.15

WIRE, Cold-Rolled Flat

Anderson,Ind. G6	6.20
Buffalo W12	6.35
Cleveland A7	5.85
Crawfordsville,Ind. M8.	6.20
Detroit D2	6.20
Dover,O. G6	6.20
Fostoria,O. S1	6.00
Kokomo,Ind. C16	5.70
Franklin Park,Ill. T6	6.20
Massillon,O. R8	5.85
Monessen,Pa. P16	5.85
Monessen,Pa. P7	6.10
NewHaven,Conn. D2	6.50
Pawtucket,R.I.(12) N8.	6.85
Trenton,N.J. R5	6.15
Worcester A7	6.15
Worcester T6	6.50
Worcester W12	6.65

WIRE, Fine & Weaving(8" Coils)

Bartonville,Ill.(1) K4	8.90
Buffalo W12	8.90
Chicago W13	8.90
Cleveland A7	8.90
Crawfordsville, Ind. M8.	8.95
Fostoria,O. S1	8.90
Johnstown,Pa. B2	8.90
Kokomo,Ind. C16	8.90
Monessen,Pa. P16	8.90
Palmer,Mass. W12	9.20
Portsmouth,O. P12	8.90
Roebling,N.J. R5	9.20
Waukegan,Ill. A7	8.90
Worcester,Mass. A7, T6.	9.20

WIRE, Galv'd ACSR for Cores

Bartonville,Ill. K4	8.50
Monessen,Pa. P16	8.50
Roebling,N.J. R5	8.80
SparrowsPoint,Md. B2	8.60
Johnstown,Pa. B2	8.50

WIRE, Tire Bead

Bartonville,Ill.(1) K4	10.90
Monessen,Pa. P16	11.40
Roebling,N.J. R5	11.55

WIRE, MB Spring, High Carbon

Aliquippa,Pa. J5	6.25
Alton,Ill.(1) L1	6.25
Bartonville,Ill.(1) K4	6.25
Buffalo W12	6.25
Cleveland A7	6.25
Donora,Pa. A7	6.25
Duluth A7	6.25
Fostoria,O. S1	6.25
Johnstown,Pa. B2	6.25
LosAngeles B3	7.20
Milbury,Mass.(12) N6	8.05
Monessen,Pa. P7, P16	6.25
Palmer,Mass. W12	6.55
Pittsburg,Calif. C11	7.20
Roebling,N.J. R5	6.25
Portsmouth,O. P12	6.25
So. Chicago,Ill. R2	6.25
So.SanFrancisco C10	7.20
SparrowsPoint,Md. B2	6.35
Struthers,O. Y1	6.25
Trenton,N.J. A7	6.55
Waukegan,Ill. A7	6.25
Worcester A7, T6, W12	6.55
Worcester,Mass. J4	6.75

WIRE, Upholstery Spring

Aliquippa,Pa. J5	5.90
Alton,Ill.(1) L1	5.90
Buffalo W12	5.90
Cleveland A7	5.90
Donora,Pa. A7	5.90
Duluth,Minn. A7	5.90
Johnstown,Pa. B2	5.90
Los Angeles B3	6.85
Monessen,Pa. P7, P16	5.90
NewHaven,Conn. A7	6.20
Palmer,Mass. W12	6.20
Pittsburg,Calif. C11	6.85
Portsmouth,O. P12	5.90
Roebling,N. J. R5	6.20
So.Chicago,Ill. R2	5.90
So.SanFrancisco C10	6.85
SparrowsPoint,Md. B2	6.00
Torrance,Calif. C11	6.85
Trenton, N.J. A7	6.20
Waukegan,Ill A7	5.90
Worcester,Mass. A7	6.20

WOVEN FENCE, 9-15½ Ga. Col.

AlabamaCity,Ala. R2	126
Ala.City,Ala.,17-18ga.R2	213
Aliquippa,Pa.9-14½ga.J5	130
Atlanta A11	133
Bartonville,Ill.(19) K4	130
Crawfordsville,Ind. M8	132
Donora,Pa. A7	130
Duluth,Minn. A7	130
Fairfield,Ala. T2	130
Houston,Tex. S5	138
Johnstown,Pa. B2	130
Johnstown,17ga.,6" B2	204
Johnstown,17ga.,4" B2	207
Joliet, Ill. A7	130
KansasCity,Mo. S5	142
Kokomo,Ind. C16	132
Minnequa,Colo. C10	138
Monessen,Pa. P7	135
Pittsburg,Calif. C11	153
Portsmouth,O.(18) P12	137
Rankin,Pa. A7	130
So.Chicago,Ill. R2	126
Sterling,Ill.(1) N15	130

FENCE POSTS

ChicagoHts.,Ill. C2	140
Duluth, Minn. A7	125
Franklin,Pa. F5	140
Huntington,W.Va. W7	140
Johnstown,Pa. B2	140
Marion,O. P11	140
Minnequa,Colo. C10	130
Moline,Ill. R2	136
So.Chicago R2	140
Tonawanda,N.Y. B12	140
Williamsport,Pa. S19	150

WIRE, Barbed	Col.
AlabamaCity,Ala. R2	136
Aliquippa,Pa. J5	140
Atlanta A11	143
Bartonville,Ill.(19) K4	143
Crawfordsville,Ind. M8	145
Donora,Pa. A7	140
Duluth,Minn. A7	140
Fairfield,Ala. T2	140
Houston,Tex. S5	148
Johnstown,Pa. B2	140
Joliet,Ill. A7	140
KansasCity,Mo. S5	152
Kokomo,Ind. C16	142
Minnequa,Colo. C10	146
Monessen,Pa. P7	145
Pittsburg,Calif. C11	160
Portsmouth,O.(18) P12	147
Rankin,Pa. A7	140
So.Chicago,Ill. R2	136
So.SanFran.,Calif. C10	160
SparrowsPoint,Md. B2	142
Sterling,Ill.(1) N15	140

BALE TIES, Single Loop	Col.
AlabamaCity,Ala. R2	123
Atlanta A11	126
Bartonville,Ill.(19) K4	123
Crawfordsville,Ind. M8	132
Donora,Pa. A7	123
Duluth,Minn. A7	123
Fairfield,Ala. T2	123
Joliet,Ill. A7	123
KansasCity,Mo. S5	135
Kokomo,Ind. C16	125
Minnequa,Colo. C10	128
Pittsburg,Calif. C11	147
So.Chicago,Ill. R2	123
So.SanFran.,Calif. C10	147
SparrowsPoint,Md. B2	125
Sterling,Ill.(1) N15	123

NAILS & STAPLES, Non-Stock

AlabamaCity,Ala. R2	6.10
Bartonville,Ill.(19) K4	5.95
Crawfordsville,Ind. M8	6.30
Donora,Pa. A7	5.95
Duluth,Minn. A7	5.95
Johnstown,Pa. B2	5.95
Joliet,Ill. A7	5.95
Kokomo,Ind. C16	6.05
Minnequa,Colo. C10	6.20
Pittsburg,Calif. C11	6.90
Portsmouth,O. P12	6.25
Rankin,Pa. A7	5.95
So. Chicago,Ill. R2	6.10
SparrowsPoint,Md. B2	6.05
Sterling,Ill.(1) N15	5.65
Worcester,Mass. A7	6.25

NAILS, Cut (100 lb keg) To dealers (33)	
Conshohocken,Pa. A3	7.35
Wheeling,W.Va. W10	7.35

NAILS & STAPLES, Stock

To dealers & mfrs. (1)	Col.
AlabamaCity,Ala. R2	118
Aliquippa,Pa. (13) J5	118
Atlanta A11	121
Bartonville,Ill.(19) K4	118
Chicago,Ill. W13	118
Cleveland A9	125
Crawfordsville,Ind. M2	122
Donora,Pa. A7	118
Duluth,Minn. A7	118
Fairfield,Ala. T2	118
Galveston,Tex. D7	126
Houston,Tex. S5	126
Johnstown,Pa. B2	118
Joliet,Ill. A7	118
KansasCity,Mo. S5	130
Kokomo,Ind. C16	120
Minnequa,Colo. C10	123
Monessen,Pa. P7	124
Pittsburg,Calif. C11	137
Portsmouth,O. P12	124
Rankin,Pa. A7	118
So.Chicago,Ill. R2	118
SparrowsPoint,Md. B2	120
Sterling,Ill.(1) N15	118
Torrance,Calif. C11	128
Worcester,Mass. A7	124

STANDARD TRACK SPIKES

Ind.Harbor,Ind. I-2, Y1.	6.15
KansasCity,Mo. S5	6.40
Lebanon,Pa. B2	6.15
Minnequa,Colo. C10	6.15
Pittsburgh J5	6.15
Seattle B3	6.65
So.Chicago,Ill. R2	6.15
Struthers,O. Y1	6.15
Youngstown R2	6.15

TRACK BOLTS (20) Treated

KansasCity,Mo. S5	9.85
Lebanon,Pa.(32) B2	9.85
Minnequa,Colo. C10	9.85
Pittsburgh O3, P14	9.85
Seattle B3	10.35

TIE PLATES

Fairfield,Ala. T2	4.50
Gary,Ind. U5	4.50
Ind.Harbor,Ind. I-2	4.50
Lackawanna,N.Y. B2	4.50
Minnequa,Colo. C10	4.50
Pittsburg,Calif. C11	4.65
Seattle B3	4.65
Steelton,Pa. B2	4.50
Torrance,Calif. C11	4.65

JOINT BARS

Bessemer, Pa. U5	4.70
Fairfield,Ala. T2	4.70
Ind.Harbor,Ind. I-2	4.70
Joliet,Ill. U5	4.70
Lackawanna,N.Y. B2	4.70
Minnequa,Colo. C10	4.70
Steelton,Pa. B2	4.70

AXLES

Ind.Harbor,Ind. S18	5.60
Johnstown,Pa. B2	5.60

RAILS	Std. No. 1	Std. No. 2	Std. All No. 2	Tee Rails 60 lb Under
Bessemer,Pa. U5	3.60	3.50	3.55	4.00
Ensley,Ala. T2	3.60	3.50	...	4.00
Fairfield,Ala T2	...	...	...	4.00
Gary,Ind. U5	3.60	3.50	3.55	...
Huntington,W.Va. W7	...	...	...	5.00
Ind.Harbor,Ind. I-2	3.60	3.50	3.55	...
Johnstown,Pa. B2	...	...	...(16)	4.00
Lackawanna B2	3.60	3.50	...	4.00
Minnequa,Colo. C10	3.60	3.50	...	4.50
Steelton,Pa. B2	3.60	3.50	...	...
Williamsport,Pa. S19	...	...	...	4.75

TOOL STEEL

Grade	$ per lb	—Grade by Analysis— W	Cr	V	Co	Mo	$ per lb
Reg. Carbon	0.230	20.25	4.25	1.6	12.25	..	3.535–3.675
Extra Carbon	0.270	19	4	2	7	..	2.460
Spec. Carbon.	0.325	18.25	4.25	1	4.75	..	2.125
Oil Hardening.	0.350	18	4	2	9	..	2.445–2.450
5% Cr Hot Wrk	0.350	13.5	4	3	..	..	1.60¼
Hi-Carbon-Cr.	0.635	6.4	4.5	1.9	..	5	0.96–0.965
18W,4Cr,1V	1.505	6	4	3	..	6	1.190
18W,4Cr,2V	1.650	1.5	4	1	..	8.5	0.810

Tool steel producers include: A4, A8, B2, B8, C4, C6, C13, C18, D4, F2, J3, L3, M14, S8, U4, V2, V3.

Key to Producers

M1 McLouth Steel Corp.
M4 Mahoning Valley Steel
M5 Medart Co.
M6 Mercer Tube & Mfg. Co.
M8 Mid-States Steel & Wire
M9 Midvale Co.
M12 Moltrup Steel Products
M13 Monarch Steel Co.
M14 McInnes Steel Co.

N2 National Supply Co.
N3 National Tube Co.
N5 Nelsen Steel & Wire Co.
N6 NewEng.HighCarb.,Wire
N8 Newman-Crosby Steel
N12 Niles Rolling Mill Co.
N14 Nrthwst. Steel Roll. Mills
N15 Northwestern S.&W. Co.
N16 New Delphos Mfg. Co.

O3 Oliver Iron & Steel Corp.
O4 Oregon Steel Mills

P1 Pacific States Steel Corp.
P2 Pacific Tube Co.
P4 Phoenix Iron & Steel Co.
P5 Pilgrim Drawn Steel
P6 Pittsburgh Coke & Chem.
P7 Pittsburgh Steel Co.
P9 Pittsburgh Tube Co.
P11 Pollak Steel Co.
P12 Portsmouth Division, Detroit Steel Corp.
P13 Precision Drawn Steel
P14 Pitts. Screw & Bolt Co.
P15 Pittsburgh Metallurgical
P16 Page Steel & Wire Div., Amer. Chain & Cable
P17 Plymouth Steel Co.

R1 Reeves Steel & Mfg. Co.
R2 Republic Steel Corp.
R3 Rhode Island Steel Corp.
R5 Roebling's Sons, John A.
R6 Rome Strip Steel Co.
R7 Rotary Electric Steel Co.
R8 RelianceDiv.,EatonMfg.

S1 Seneca Wire & Mfg. Co.
S3 Sharon Steel Corp.
S5 Sheffield Steel Corp.
S6 Shenango Furnace Co.
S7 Simmons Co.
S8 Simonds Saw & Steel Co.
S9 Sloss-Sheffield, S.&I. Co.
S13 Standard Forgings Corp.
S14 Standard Tube Co.
S15 Stanley Works
S16 Struthers Iron & Steel
S17 Superior Drawn Steel Co.
S18 Superior Steel Corp.
S19 Sweet's Steel Co.
S20 Southern States Steel
T2 Tenn. Coal, Iron & R.R.
T3 Tenn. Prod. & Chem.
T4 Texas Steel Co.
T5 Thomas Steel Co.
T6 Thompson Wire Co.
T7 Timken Roller Bearing
T9 Tonawanda Iron Div. Am. Rad. & Stan. San.

U1 Ulster Iron Works
U4 Universal Cyclops Steel
U5 United States Steel Co.

V2 Vanadium-Alloys Steel
V3 Vulcan Crucible Steel Co.

W1 Wallace Barnes Co.
W2 Wallingford Steel Co.
W3 Washburn Wire Co.
W4 Washington Steel Corp.
W6 Weirton Steel Co.
W7 W. Va. Steel & Mfg. Co.
W8 West.Auto.Mach.Screw
W9 Wheatland Tube Co.
W10 Wheeling Steel Corp.
W12 Wickwire Spencer Steel Div., Colo. Fuel & Iron
W13 Wilson Steel & Wire Co.
W14 Wisconsin Steel Div. International Harvester
W15 Woodward Iron Co.
W18 Wyckoff Steel Co.

Y1 Youngstown Sheet & Tube

(1 Chicago base.
(2) Angles, flats, bands.
(3) Merchant. (4) Reinforcing.
(5) Philadelphia del.
(6) Chicago or Birm. base.
(7) To jobbers, 3 cols. lower.
(8) 16 gage and heavier.
(9) 6 in. and narrower.
(10) Pittsburgh base.
(11) Cleveland & Pittsburgh base.
(12) Worcester, Mass. base.
(13) Add 0.50c for 17 Ga.& heavier.
(14) Also wide flange beams.
(15) ½" and thinner.
(16) 40 lb and under.
(17) Flats only.
(18) To dealers.
(19) Chicago & Pittsburgh base.
(20) Deduct 0.25c for untreated.
(21) New Haven,Conn. base.
(22) Del. San Fran. Bay area.
(23) 28 Ga. 36" wide.
(24) Deduct 0.20c, finer than 15 Ga.
(25) Bar mill bands.
(26) Reinforcing, mill lengths, to fabricators; to consumers, 5.60c.
(27) Bar mill sizes.
(28) Bonderized.
(29) Subject to 10% increase.
(30) Sheared: add 0.35c for universal mill.
(31) Not annealed.
(32) Rd. edge or square edge.
(33) To jobbers, deduct 20 cents.
(34) 7.25c for cut lengths.
(35) 72" and narrower.
(36) 54" and narrower.
(37) 15 gage & lighter: 60" & narrower.
(38) 14 gage & lighter: 48" & narrower
(39) 48" and narrower.
(40) Lighter than 0.035"; 0.035" and heavier, 0.25c higher.

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STANDARD PIPE, T. & C.

BUTTWELD Size Inches	List Per Ft	Pounds Per Ft	Carload Discounts from List, % Black A	Black B	Black C	Galvanized D	Galvanized E	Galvanized F
⅛	5.5c	0.24	34.0	32.0	29.0	1.5	+0.5	+3.5
¼	6.0	0.42	28.5	26.5	23.5	+1.0	+3.0	+6.0
⅜	6.0	0.57	23.5	21.5	18.5	+7.0	+9.0	+12.0
½	8.5	0.85	36.0	34.0	35.0	14.0	12.0	13.0
¾	11.5	1.18	39.0	37.0	38.0	18.0	16.0	17.0
1	17.0	1.68	41.5	39.5	40.5	21.5	19.5	20.5
1¼	23.0	2.28	42.0	44.0	41.0	22.0	24.0	21.0
1½	27.5	2.78	42.5	41.5	41.5	23.0	21.5	22.0
2	37	3.68	43.0	41.0	42.0	23.5	21.5	22.5
2½	58.5	5.82	43.5	41.5	42.5	24.0	22.0	23.0
3	76.5	7.62	43.5	41.5	42.5	24.0	22.0	23.0

Column A: Etna, Pa. N2; Butler, Pa. ⅛-⅜", F6; Benwood, W. Va., 3½ points lower on ⅛" 1½ points lower on ¼", and 2 points lower on ⅜", W10; Sharon, Pa. M6, 1 point higher on ⅛", 2 points lower on ¼" and ⅜". Following make ½" and larger: Lorain, O., N3; Youngstown R2 and 36¼% on 3½" and 4"; Youngstown Y1; Aliquippa, Pa. J5; Fontana, Calif. K1 quotes 11½ points lower on ½" and larger continuous weld and 24% on 3½" and 4". Columns B & E: Sparrows Point, Md. B2.

Columns C & F: Indiana Harbor, Ind., ½" through 3", Y1; Alton, Ill. (Gary base) L1.

Column D: Butler, Pa. F6, ⅛-⅜"; Benwood, W. Va. W10, except plus 3½% on ⅛", plus 2½% on ¼", plus 9% on ⅜"; Sharon, Pa. M6, plus 0.5 on ⅛", 1 point lower on ½", ¾", 1½ points lower on 1" and 1¼", 2 points lower on 1½", 2", 2½" and 3". Following quote only on ½" and larger: Lorain, O. N3; Youngstown R2, and 16½% on 3½" and 4"; Youngstown Y1. Aliquippa, Pa. J5 quotes 1 point lower on ¾", 2 points lower on 1", 1½ points lower on 1¼", 2 points lower on 1½" and 2", 1½ points lower on 2½" and 3"; Etna, Pa. N2 and 18½% on 3½" and 4".

SEAMLESS AND ELECTRIC WELD Size Inches	List Per Ft	Pounds Per Ft	Carload Discounts from List, % Seamless Black A	Seamless Galv. B	Elec. Weld Black C	Elec. Weld Galv. D
2	37.0c	3.68	29.5	9.5	29.5	9.5
2½	58.5	5.82	32.5	12.5	32.5	12.5
3	76.5	7.62	32.5	12.5	32.5	12.5
3½	92.0	9.20	34.5	14.5	34.5	14.5
4	$1.09	10.89	34.5	14.5	34.5	14.5
5	1.48	14.81	37.0	17.0	37.0	17.0
6	1.92	19.18	37.0	17.0	37.0	17.0

Column A: Aliquippa J5; Ambridge N2; Lorain N3; Youngstown Y1.

Column B: Aliquippa J5 quotes 1½ pts lower on 2", 1 pt lower on 2½-6 in.; Lorain N3; Youngstown Y1.

Columns C & D: Youngstown R2.

BOILER TUBES

Net base c.l. prices, dollars per 100 ft, mill; minimum wall thickness, cut lengths 10 to 24 ft, inclusive.

O.D. In.	B.W. Ga.	Seamless H.R.	Seamless C.D.	Elec. Weld H.R.	Elec. Weld C.D.
1	13	13.45	16.47	15.36	15.36
1¼	13	16.09	19.71	15.61	18.19
1½	13	17.27	21.15	17.25	20.30
1¾	13	19.29	23.62	19.62	23.09
2	13	21.62	26.48	21.99	25.86
2¼	13	24.35	29.82	24.50	28.84
2½	12	26.92	32.97	26.98	31.76
2¾	12	29.65	36.32	29.57	34.76
2¾	12	32.11	39.33	31.33	36.84
3	12	34.00	41.64	32.89	38.70

CLAD STEELS

(Cents per pound)

Cladding Stainless	Plates—Carbon Base 10%	Plates—Carbon Base 20%	Strip—Cold-Rolled Carbon Base 10%	Strip—Cold-Rolled Carbon Base Both Sides	Sheets—Carbon Base 10%	Sheets—Carbon Base 20%	Sheets—Cu Base Both Sides
302	....	....	....	....	19.75	26.24–27.50	77.00
304	25.00	29.50	....	....	24.50	27.50–27.77	77.00
309	30.50	35.00	....	....	....	....	....
310	36.50	41.00	....	....	....	....	144.00
316	29.50	34.00	....	....	26.00	35.92–36.50	....
317	34.50	39.00	....	....	....	....	....
318	33.50	38.00	....	....	....	....	....
321	26.50	31.00–32.00	....	....	23.00	33.00	111.00
347	27.50	32.00	....	....	24.00	33.50–33.83	130.00
405	21.25	27.75	....	....	....	....	....
410	20.75	27.25	....	....	....	....	....
Nickel	33.55	45.15	41.00	54.00	....	....	....
Inconel	41.23	54.18	....	....	....	....	165.00
Monel	34.93	46.28	....	....	....	....	....
Copper*	....	....	23.70†	29.65‡	....	....	....

* Deoxidized. † 20.20c for hot-rolled. ‡ 26.40c for hot-rolled. Production points for carbon base products: Stainless plates, sheet, Conshohocken, Pa. A3 and New Castle, Ind. I-4; stainless-clad plates, Claymont, Del. C22, Coatesville, Pa. L7 and Washington, Pa. J3; nickel, inconel, monel-clad plates, Coatesville L7; nickel, copper-clad strip, Carnegie, Pa., S18. Production point for copper-base sheets is Carnegie, Pa. A13.

BOLTS, NUTS

CARRIAGE, MACHINE BOLTS

(F.o.b. midwestern plants; per cent off list for less than case lots to consumers)

6 in. and shorter:
- ½-in. & smaller diam. 15
- ⅝-in. & ⅞-in. 18.5
- 1-in. and larger 17.5

Longer than 6 in.:
- All diams. 14

Lag bolts, all diams.:
- 6 in. and shorter 23
- over 6 in. long 21

Ribbed Necked Carriage 18.5
Blank 34
Plow 34
Step, Elevator, Tap, and Sleigh Shoe 21
Tire bolts 12
Boiler & Fitting-Up bolts 31

NUTS

H.P. & C.P.	Reg.	Heavy
Square:		
½-in. & smaller	15	15
⅝-in. & ⅞-in..	12	6.5
¾-in.-1½-in. ..	9	1
1⅝-in. & larger	7.5	1
H.P. Hex.:		
½-in. & smaller	26	22
⅝-in. & ⅞-in.	16.5	6.5
¾-in.-1½-in. ..	12	2
1⅝-in. & larger	8.5	2
C.P. Hex.:		
½-in. & smaller	26	22
⅝-in. & ⅞-in. .	23	17.5
¾-in. & 1½-in.	19.5	12
1⅝-in. & larger	12	6.5

SEMIFINISHED NUTS

American Standard

(Per cent off list for less than case or key quantities)

	Reg.	Hvy.
½-in. & smaller ...	35	28.5
⅝-in. & ⅞-in. ...	29.5	22
¾-in.-1½-in.	24	15
1⅝-in. & larger....	13	8.5
		Light
⅞-in. & smaller		35
1-in. to ⅞-in.		28.5
¾-in. to 1½-in.		26

STEEL STOVE BOLTS

(F.o.b. plant; per cent off list in packages)

Plain finish .....48 & 10
Plated finishes ...31 & 10

HEXAGON CAP SCREWS

(1020 steel; packaged; per cent off list)

6 in. or shorter:
- ⅝-in. & smaller 42
- ¾-in. through 1 in. .. 34

Longer than 6 in.:
- ⅝-in. & smaller 26
- ¾-in. through 1 in. ... 4

SQUARE HEAD SET SCREWS

(Packaged; per cent off list)

1 in. diam. x 6 in. and shorter 38
1 in. and smaller diam. x over 6 in.. 26

HEADLESS SET SCREWS

(Packaged; per cent off list)

No. 10 and smaller 35
¼-in. diam. & larger ... 16
N.F. thread, all diams. . 10

RIVETS

F.o.b. midwestern plants
Structural ½-in., larger 7.85c
1-in. under ..... 36 off

WASHERS, WROUGHT

F.o.b. shipping point, to jobbers ..List to list-plus-$1.

FLUORSPAR

Metallurgical grade, f.o.b. shipping point, in Ill., Ky., net tons, carloads, effective CaF_2 content, 70%, $43; 60%, $40.

Imported, net ton, duty paid, metallurgical grade, $33-$35.

ELECTRODES

(Threaded, with nipples, unboxed, f.o.b. plant)

GRAPHITE

Inches Diam.	Length	Cents per lb
17,18,20	60,72	17.85
8 to 16	48,60,72	17.85
7	48,60	19.57
6	48,60	20.95
	CARBON	
35, 40	110	8.03
30	65,84,110	8.03
24	72 to 104	8.03
17 to 20	34,90	8.03

STAINLESS STEEL

Type	Sheets	C.R. Strip	Bars Wire Structurals
301...	41.00	34.00	31.25
302...	41.25	36.75	31.50
303...	43.25	40.25	34.00
304...	43.25	38.75	33.00
309...	56.00	55.00	44.75
316...	57.00	59.00	49.25
321...	49.25	48.25	37.00
347...	53.75	52.25	41.50
410...	36.50	30.50	25.75
416...	37.00	37.00	26.25
420...	44.00	47.00	31.25
430...	39.00	31.00	26.25
501...	27.50	26.00	14.25
502...	28.50	27.00	15.25

Baltimore, Tpes 301 through 347 sheet, except 303 and 309 E2.

Brackenridge, Pa., sheets A4 quotes slight variations on Tpes 301-347.

Bridgeville, Pa., bars, wire, sheets & strip U4.

Butler, Pa., sheets and strip except Types 303, 309, 416, 420, 501 & 502, A10.

Carnegie, Pa., sheets and strip except Types 303, 416, 501 & 502 and 0.25c lower on Types 302, 304, 321, 347; 0.50c lower on Types 309 and 316 S18.

Cleveland, strip A7.

Detroit, strip M1 quotes 34.00 on Type 301, 36.50 on 302 38.50 on 304, 58.50 on 316, 52.00 on 347, 30.50 on 410, and 31.00 on 430.

Dunkirk, N. Y., bars, wire A4 quotes slight variations on Types 301-347.

Duquesne, Pa., bars U5.

Fort Wayne, Ind., bars and wire, except Types 501 & 502 J6 quotes slight variations on Types 301-347.

Gary, Ind., sheets except Type 416 U5.

Harrison, N. J., strip and wire C18.

Massillon, O., all products, R2.

McKeesport, Pa., strip, Type 410; bars & wire, Types 410 through 430 and 31.25c on Type 302, 33.75c on 303, 32.75c on 304, 48.75c on 316, 36.75c on 321, 41.25c on 347 F2.

McKeesport, Pa., bars, sheets except Type 416 U5.

Middletown, O., sheets and strip except Types 303, 416, 420, 501 and 502 A10.

Midland, sheets & strip C18.

Munhall, Pa., bars U5.

Pittsburgh, sheets C18.

Reading, Pa., strip except 34.25c for Type 301 and 56.00c for Type 309; bars, except 31.50c for Type 301 and 45.25c for Type 309 C4.

Sharon, Pa., strip, except Types 303, 309, 416, 501, 502 and 34.25c on Type 301 S3.

So. Chicago, Ill., bars & structurals U5.

Syracuse, N. Y., bars, wire & structurals C18.

Titusville, Pa., bars, U4.

Wallingford, Conn., strip, W2 quotes 0.25c higher.

Washington, Pa., bars, sheets & strip, except 0.25c higher on Type 301 J3.

Washington, Pa., Types 301 through 347 sheets & strip except 303 & 309; 316 sheets 62.00c, strip 64.00c W4.

Watervliet, N. Y., structurals & bars A4 quotes slight variations on Types 301-347.

Waukegan, bars & wire A7.

West Leechburg, Pa., strip, A4 quotes slight variations on Types 301-347.

COAL CHEMICALS

Spot, cents per gallon, ovens
Pure benzol 30.00-35.00
Toluol, one deg...26.00-33.00
Industrial xylol ..25.00-33.50
Per ton bulk, ovens
Sulphate of ammonia .$32-$45
Cents per pound, ovens
Phenol, 40 (carlots, non-returnable drums) ..17.25

METAL POWDERS

(Per pound, f.o.b. shipping point in ton lots for minus 100 mesh, except as otherwise noted)

Sponge iron	Cents
98+% Fe, carlots..	16.00
Swedish, c.l.f. New York, in bags ...	7.40-8.50
Electrolytic Iron:	
Annealed, 99.5% Fe.	42.50
Unannealed, 99 + % Fe	36.50
Unannealed, 99 + % Fe (minus 325 mesh)	58.50
Powder Flakes	48.50
Carbonyl Iron:	
97.9-99.8%, size 5 to 10 microns ...	83.00-148.00
Aluminum:	
Carlots, freight allowed	29.50
Atomized, 500 lb drums, freight allowed	33.50
Brass, 10-ton lots	30.00-33.25
Bronze, 10-ton lots	51.25-60.00
Phosphor-Copper, 10 tons	50.00
Copper:	
Electrolytic	43.25
Reduced	33.75-37.00
Lead	25.50
Magnesium	75.00-85.00
Manganese:	
Minus 100-mesh	57.00
Minus 35 mesh	52.00
Minus 200 mesh	62.00
Nickel unannealed ...	83.00
Nickel-Silver, 10-ton lots	44.00
Silicon	38.50
Solder (plus cost of metal)	8.50
Stainless Steel, 302 ..	83.00
Zinc, 10-ton lots.	23.00-30.50
Tungsten	Dollars
99%, minus 80 to 200 mesh, freight allowed:	
1000 lb and over ..	4.00
Less than 1000 lb ..	4.15
98.8% minus 65 mesh, freight allowed:	
1000 lb and over ...	4.15
less than 1000 lb ..	4.25
Molybdenum:	
99%, minus 80 to 200 mesh, over 500 lb	2.85
200 to 500 lb	3.10
less than 200 lb ..	3.25
Chromium, electrolytic 99% Cr min.	3.50

METALLURGICAL COKE

Price per net ton

BEEHIVE OVENS

Connellsvll, fur. .$14.50-15.00
Connellsvll, fdry. .17.00-18.00
New River, foundry ...21.30
Wise county, foundry ..15.95
Wise county, furnace ..15.20

OVEN FOUNDRY COKE

Kearney, N. J., ovens .$22.75
Everett, Mass., ovens
New England, del.. *24.80
Chicago ovens 23.00
Chicago, del. 24.40
Terre Haute, ovens ...22.50
Milwaukee, ovens 23.75
Indianapolis, ovens ...22.75
Chicago, del. 26.28
Cincinnati, del. 25.73
Detroit, del. 26.71
Ironton, O., ovens 22.50
Cincinnati, del. 25.12
Painesville, O., ovens..24.00
Cleveland, del. 25.75
Erie, Pa., ovens 23.50
Birmingham, ovens ...20.30
Birmingham, del. 21.69
Philadelphia, ovens ..22.70
NevilleIsland, Pa., ovens 23.00
Swedeland, Pa., ovens..22.60
St. Louis, ovens
St. Louis, del. 25.40
Portsmouth, O., oven..22.50
Cincinnati, del. 25.12
Detroit, ovens 24.00
Detroit, del. 25.00
Buffalo, del. 26.75
Flint, del. 26.49
Pontiac, del. 25.42
Saginaw, del. 26.81

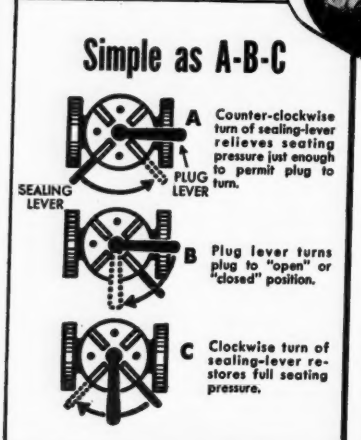
* Or within $4.15 freight zone from works.

- **at all times**
- **under all conditions**
- **throughout its long lifetime of service**

This Homestead Valve will always work

it's stickproof because it's lever-seald

Simple as A-B-C


A
Counter-clockwise turn of sealing-lever relieves seating pressure just enough to permit plug to turn.
SEALING LEVER
PLUG LEVER
B
Plug lever turns plug to "open" or "closed" position.
C
Clockwise turn of sealing-lever restores full seating pressure.

Homestead Lever-Seald Valves operate faster, too—16 to 28 times faster than screw-stem type valves. They require no lubrication . . . provide unobstructed, straight-line fluid flow with minimum pressure drop . . . afford maximum protection to sealing surfaces against corrosive and erosive line fluids. And because only a quarter-turn is needed for full opening or closing, they are ideal for installation in restricted areas where operation of other types of valves might be difficult.

Next time you have damaged or sticking valves, replace them with Homestead Lever-Seald Plug Valves. Once you use them you'll never be satisfied with ordinary valves.

For complete information write for Valve Reference Book No. 39-3.

HOMESTEAD LEVER-SEALD PLUG VALVES

HOMESTEAD VALVE MANUFACTURING COMPANY

P.O. BOX 22 — *Serving since 1892* — CORAOPOLIS, PA.

WAREHOUSE STEEL PRODUCTS

(Prices, cents per pound, for delivery within switching limits, subject to extras)

	SHEETS			STRIP		BARS			Standard Structural Shapes	PLATES	
	H.R. 18 Ga., Heavier*	C.R.	Gal. 10 Ga.†	H.R.*	C.R.*	H.R. Rds.	C.F. Rds.	H.R. Alloy 4140‡		Carbon	Floor
New York (city)	6.27	7.29	8.44	6.59	...	6.42	7.29	9.25	6.40	6.58	8.04
New York (c'try)	5.97	6.99	8.14	6.29	...	6.12	6.99	8.95	6.10	6.28	7.74
Boston (city)	6.40	7.20	8.49	6.35	...	6.25	7.04	9.25	6.40	6.98	7.88
Boston (c'try)	6.20	7.00	8.29	6.15	...	6.05	6.84	9.05	6.20	6.78	7.68
Phila. (city)	6.15	7.05	8.25	6.35	...	6.30	7.11	8.90	6.15	6.30	7.40
Phila. (c'try)	5.90	6.80	8.00	6.10	...	6.05	6.86	8.65	5.90	6.05	7.15
Balt. (city)	5.80	7.04	8.27	6.24	...	6.24	7.09	...	6.34	6.00	7.64
Balt. (c'try)	5.60	6.84	8.07	6.04	...	6.04	6.89	...	6.14	5.80	7.44
Norfolk, Va.	6.50	...	...	6.70	...	6.55	7.70	...	6.60	6.50	8.00
Richmond, Va.	5.90	...	8.10	6.10	...	6.10	6.90	...	6.30	6.05	7.80
Wash. (w'hse)	6.02	7.26	8.49	6.46	...	6.46	7.26	...	6.56	6.22	7.86
Buffalo (del.)	5.80	6.60	8.29	6.06	...	5.80	6.65	10.65††§	6.00	6.25	7.55
Buffalo (w'hse)	5.60	6.40	8.09	5.86	...	5.60	6.45	10.45††§	5.80	6.05	7.35
Pitts. (w'hse)	5.60	6.40*	7.75	5.65-5.95	6.90	5.55	6.40	10.10††	5.70	5.75	7.00
Detroit (w'hse)	5.45-5.78	6.53-6.80	7.99	5.94-5.95	7.75	5.84	6.56	8.91	6.09	6.19-6.35	7.28
Cleveland (del.)	5.80	6.60	8.30	5.89	7.10	5.77	6.60-6.70	8.91	10.02	6.12	7.32
Cleve. (w'hse)	5.60	6.40	8.10	5.69	6.90	5.57	6.40-6.50	8.71	5.82	5.92	7.12
Cincin. (city)	6.02	6.59	7.34	5.95	...	5.95	6.51	...	6.24	6.34	7.50
Chicago (city)	5.80	6.60	7.95	5.75	...	5.75	6.50	10.30	5.90	6.00	7.20
Chicago (w'hse)	5.60	6.40	7.75	5.55	...	5.55	6.30	10.10	5.70	5.80	7.00
Milwaukee (city)	5.94	6.74	8.09	5.89	...	5.89	6.74	10.44	6.04	6.14	7.34
Milwau. (c'try)	5.74	6.54	7.89	5.69	...	5.69	6.54	10.24	5.84	5.94	7.14
St. Louis (del.)	6.05	6.85	8.20	6.00	...	6.00	6.85	10.55	6.23	6.33	7.53
St. L. (w'hse)	5.85	6.65	8.00	5.80	...	5.80	6.65	10.35	6.03	6.13	7.33
Kans. City (city)	6.40	7.20	8.40	6.35	...	6.35	7.20	...	6.50	6.60	7.80
Kans City (w'hse)	6.20	7.00	8.20	6.15	...	6.15	7.00	...	6.30	6.40	7.60
Birm'hm (city)	5.75	6.55	6.90[2]	5.70	...	5.70	7.53	...	5.85	6.10	8.25
Birm'hm (w'hse)	5.60	6.40	6.75[2]	5.55	...	5.55	7.53	...	5.70	5.95	8.23
Los Ang. (city)	6.55	8.10	9.05[2]	6.60	8.90	6.55	7.75	...	6.55	6.60	9.20
L. A. (w'hse)	6.35	7.90	8.85[2]	6.40	8.70	6.35	7.55	...	6.35	6.40	8.70
San Francisco	6.65	7.80[4]	8.90[2]	6.60	...	6.45	8.20	...	6.45	6.50	8.60
Seattle-Tacoma	7.05	8.60[3]	9.20[2]	7.30	...	6.75	9.10	11.15	6.65	6.75	8.80

*Prices do not include gage extras; † prices include gage and coating extras, except Birmingham (coating extra excluded) and Los Angeles (gage extra excluded); ‡ includes extra for 10 gage; § as rolled; †† as annealed. Base quantities, 2000 to 9999 lb except as noted: Cold-rolled strip, 2000 lb and over; cold-finished bars, 2000 lb and over; [2]—500 to 1499 lb; [3]—450 to 1499 lb; [4]—3500 lb and over; [5]—1000 to 1999 lb.

ORES

Lake Superior Iron Ore

Gross ton, 51½% (natural), lower lake ports. After adjustment for analysis, prices will be increased or decreased as the case may be for increases or decreases after Dec. 2, 1950, in applicable lake vessel rates, upper lake rail freights, dock handling charges and taxes thereon.

Old range bessemer	$8.70
Old range nonbessemer	8.55
Mesabi bessemer	8.45
Mesabi nonbessemer	8.30
High phosphorus	8.30

Eastern Local Ore

Cents per unit, del. E. Pa.

Foundry and basic 56-62% concentrates contract	17.00

Foreign Ore

Cents per unit, c.i.f. Atlantic ports

Swedish basic, 60 to 68%:	
Spot	17.00
Long-term contract	15.00
North African hematites	17.00
Brazilian iron ore, 68-69%	24.00-25.00

Tungsten Ore

Net ton unit, duty paid

Foreign wolframite and scheelite, per net ton unit	$65.00
Domestic scheelite, mines	65.00

Indian manganese, 46-48% nearby, $1.05 per long ton unit, c.i.f. U. S. ports, duty for buyer's account; shipments against old contracts for 48% ore are being received from some sources at 79.8-81.8c.

Chrome Ore

Gross ton, f.o.b. cars, New York, Philadelphia, Baltimore, Charleston, S. C., plus ocean freight differential for delivery to Portland, Oreg., or Tacoma, Wash.

Indian and African

48% 2.8:1	$32.50
48% 3:1	35.00-36.00
48% no ratio	26.00

South African Transvaal

44% no ratio	$27.00-28.00
48% no ratio	34.00-35.00

Brazilian

44% 2.5:1 lump	$32.00

Rhodesian

45% no ratio	$20.00-21.00
48% no ratio	26.00
48% 3:1 lump	35.00-36.00

Domestic—rail nearest seller

48% 3:1	$39.00

Molybdenum

Sulphide concentrates per lb, molybdenum content, mines	$1.00

REFRACTORIES

Fire Clay Brick

Super Duty: St. Louis, Vandalia, Farber, Mexico, Mo., Olive Hill, Hayward, Ashland, Ky., Clearfield, Curwensville, Pa., Ottawa, Ill., $116.60. Hard-fired, St. Louis, Vandalia, Mo., Olive Hill, Ky., $156.20.

High-Heat Duty: Salina, Pa., $99.60, Woodbridge, N. J., St. Louis, Farber, Vandalia, Mexico, Mo., West Decatur, Orviston, Clearfield, Beach Creek, Curwensville, Lumber, Lockhaven, Pa., Olive Hill, Hitchins, Haldeman, Ashland, Ky., Troup, Athens, Tex., Stevens Pottery, Ga., Bessemer, Ala., Portsmouth, Oak Hill, Ottawa, Ill., $94.60.

Intermediate-Heat Duty: St. Louis, Farber, Vandalia, Mo., West Decatur, Orviston, Beach Creek, Curwensville, Lumber, Lockhaven, St. Marys, Clearfield, Pa., Olive Hill, Hitchins, Haldeman, Ashland, Hayward, Ky., Athens, Troup, Tex., Stevens Pottery, Ga., Portsmouth, O., Ottawa, Ill., $88; Bessemer, Ala., $79.20.

Low-Heat Duty: Oak Hill, or Portsmouth, O., Clearfield, Orviston, Pa., $79.20; Parral, O., $78.50; St. Marys, Pa., $76; Ottawa, Ill., $70.

Ladle Brick

Dry Press: Chester, New Cumberland, W. Va., Freeport, Merill Station, Clearfield, Pa., Irondale, Wellsville, O., $66.

Wire Cut: Chester, Wellsville, O., $64.

Malleable Bung Brick

St. Louis, Vandalia, Farber, Mo., Olive Hill, Ky., $105.60; Beach Creek, Pa., $94.60; Ottawa, Ill., $90.

Silica Brick

Mt. Union, Claysburg, or Sproul, Pa., Portsmouth, O., Ensley, Ala., $94.60; Hays, Pa., $100.10; Joliet, Rockdale, Ill., E. Chicago, Ind., $104.50; Lehi, Utah, Los Angeles, $111.10.

Eastern Silica Coke Oven Shapes (net ton): Claysburg, Mt. Union, Sproul, Pa., Birmingham, $92.40.

Illinois Silica Coke Oven Shapes (net ton): Joliet or Rockdale, Ill., E. Chicago, Ind., Hays, Pa., $93.50.

Basic Brick

Per net ton, Baltimore or Chester, Pa. Burned chrome brick, $73-$78; chemical-bonded chrome brick, $77-$82; magnesite brick, $99-$104; chemical-bonded magnesite, $88-$93.

Magnesite

Per net ton, Chewelah, Wash. Domestic dead-burned, ⅜" grains; bulk, $36.30; single paper bags, $41.80.

Dolomite

Per net ton. Domestic burned bulk; Bonne Terre, Mo., $12.15; Martin, Millersville, Narlo, Clay Center, Woodville, Gibsonburg, Bettsville, O., Bilmeyer, Plymouth Meeting, Blue Bell, Williams, Pa., Millville, W. Va., $13.

CALCIUM ALLOYS

Calcium-Manganese-Silicon: (Ca 16-20%, Mn 14-18% and Si 53-59%). Contract, carload, lump, bulk 20.0c per lb of alloy, carload packed 20.8c, ton lot 22.3c, less ton 23.3c. Delivered. Spot add 0.25c.

Calcium-Silicon: (Ca 30-33%, Si 60-65%, Fe 1.50-3%). Contract, carload, lump, bulk 19.0c per lb of alloy, carload packed 20.2c, ton lot 22.1c, less ton 23.6c. Deld. Spot add 0.25c.

ZIRCONIUM ALLOYS

12-15% Zirconium Alloy: (Zr 12-15%, Si 30-43%, Fe 40-45%, C 0.20% max.). Contract, c.l. lump, bulk 7.0c per lb of alloy, c.l. packed 7.75c, ton lot 8.5c, less ton 9.35c. Delivered. Spot, add 0.25c.

35-40% Zirconium Alloy: (Zr 35-40%, Si 47-52%, Fe 8-12%, C 0.50% max.). Contract, carload, lump, packed 20.25c per lb of alloy, ton lot 21c, less ton 22.25c. Freight allowed. Spot, add 0.25c.

BRIQUETTED ALLOYS

Chromium Briquets: (Weighing approx. 3% lb each and containing exactly 2 lb of Cr). Contract, carload, bulk, 14.50c per lb of briquet, carload packed 15.2c, ton 16.0c, less ton 16.9c. Deld. Add 0.25c for notching. Spot, add 0.25c.

Ferromanganese Briquets: (Weighing approx. 3 lb and containing exactly 2 lb of Mn). Contract, carload, bulk 10.95c per lb of briquet, c.l. packaged 11.75c, ton lot 12.55c, less ton 13.45c. Delivered. Add 0.25c for notching. Spot, add 0.25c.

Silicomanganese Briquets: (Weighing approx. 3½ lb and containing exactly 2 lb of Mn and approx. ½ lb of Si). Contract, c.l. bulk 11.15c, per lb of briquet, c.l. packed 11.95c, ton lot 12.75c, less ton 13.65c. Delivered. Add 0.25c for notching. Spot, add 0.25c.

Silicon Briquets: (Large size — weighing approx. 5 lb and containing exactly 2 lb of Si). Contract, carload, bulk 6.95c per lb of briquet, c.l. packed 7.75c, ton lot 8.85c, less ton 9.45c. Delivered. Spot, add 0.25c.
(Small size—weighing approx. 2½ lb and containing exactly 1 lb of Si). Carload, bulk 7.1c, c.l. packed 7.9c, ton lot 8.7c, less ton 9.6c. Delivered. Add 0.25c for notching, small size only. Spot, add 0.25c.

Molybdic-Oxide Briquets: (Containing 2½ lb of Mo each) $1.14 per pound of Mo contained, f.o.b. Langeloth, Pa.

NOTE: For current quotations on manganese, titanium and "other" ferroalloys, see page 147, Aug. 13 issue; for chromium, silicon, vanadium, boron, tungsten alloys, page 131, Aug. 20 issue.

CEILING PRICES, IRON AND STEEL SCRAP

Prices as set forth in Office of Price Stabilization ceiling price regulation No. 5, as amended Apr. 19, 1951

STEELMAKING SCRAP COMPOSITE

Aug. 23	$44.00
Aug. 16	44.00
July 1951	44.00
Aug. 1950	40.00
Aug. 1946	19.17

Based on No. 1 heavy melting grade at Pittsburgh, Chicago and eastern Pennsylvania.

Basing point ceiling prices per gross ton from which maximum shipping prices are computed on scrap of dealer and industrial origin; and from which ceiling on-line and ceiling delivered prices are computed on scrap of railroad origin.

No. 1 Heavy Melting Steel (Grade)1

Basing Point	Dealer, Industrial	Railroad
Alabama City, Ala.	$39.00	$41.00
Ashland, Ky.	42.00	44.00
Atlanta, Ga.	39.00	41.00
Bethlehem, Pa.	42.00	44.00
Birmingham, Ala.	39.00	41.00
Brackenridge, Pa.	44.00	46.00
Buffalo, N. Y.	43.00	45.00
Butler, Pa.	44.00	46.00
Canton, O.	44.00	46.00
Chicago, Ill.	42.50	44.50
Cincinnati, O.	43.00	45.00
Claymont, Del.	42.50	44.50
Cleveland, O.	43.00	45.00
Coatesville, Pa.	42.50	44.50
Conshohocken, Pa.	42.50	44.50
Detroit, Mich.	41.15	43.15
Duluth, Minn.	40.00	42.00
Harrisburg, Pa.	42.50	44.50
Houston, Tex.	37.00	39.00
Johnstown, Pa.	44.00	46.00
Kansas City, Mo.	39.50	41.50
Kokomo, Ind.	42.00	44.00
Los Angeles	35.00	37.00
Middletown, O.	43.00	45.00
Midland, Pa.	44.00	46.00
Minnequa, Colo.	38.00	40.00
Monessen, Pa.	44.00	46.00
Phoenixville, Pa.	42.50	44.50
Pittsburg, Calif.	35.00	37.00
Pittsburgh, Pa.	44.00	46.00
Portland, Oreg.	35.00	37.00
Portsmouth, O.	42.00	44.00
St. Louis, Mo.	41.00	43.00
San Francisco	35.00	37.00
Seattle, Wash.	35.00	37.00
Sharon, Pa.	44.00	46.00
Sparrows Point, Md.	42.00	44.00
Steubenville, O.	44.00	46.00
Warren, O.	44.00	46.00
Weirton, W. Va.	44.00	46.00
Youngstown, O.	44.00	46.00

Differentials from Base

Differentials per gross ton for other grades of dealer and industrial scrap:

O-H and Blast Furnace Grades

2. No. 2 Heavy Melting	—$2.00
3. No. 1 Busheling	Base
4. No. 1 Bundles	Base
5. No. 2 Bundles	— 3.00
6. Machine Shop Turnings	—10.00
7. Mixed Borings & Short Turnings	— 6.00
8. Shoveling Turnings	— 6.00
9. No. 2 Busheling	— 4.00
10. Cast Iron Borings	— 6.00

Elec. Furnace and Fdry. Grades

11. Billet, Bloom & Forge Crops	+ 7.50
12. Bar Crops & Plate	+ 5.00
13. Cast Steel	+ 5.00
14. Punchings & Plate Scrap	+ 2.50
15. Electric Furnace Bundles	+ 2.00
Cut Structurals & Plate:	
16. 3 feet and under	+ 3.00
17. 2 feet and under	+ 5.00
18. 1 foot and under	+ 6.00
19. Briquetted Cast Iron Borings	Base
Foundry, Steel:	
20. 2 feet and under	+ 2.00
21. 1 foot and under	+ 4.00
22. Springs and Crankshafts	+ 1.00
23. Alloy Free turnings	— 3.00
24. Heavy Turnings	— 1.00

Special Grades

25. Briquetted Turnings	Base
26. No. 1 Chemical Borings	— 3.00
27. No. 2 Chemical Borings	— 4.00
28. Wrought Iron	+10.00
29. Shafting	+10.00

Restrictions on Use

(1) Prices for Grades 11 and 23 may be charged only when shipped to a consumer directly from an industrial producer; otherwise ceiling prices shall not exceed prices established for Grades 12 and 8, respectively.
(2) Prices established for Grades 26 and 27 may be charged only when sold for use for chemical or annealing purposes, and in the case of Grade 27, for briquetting and direct charge into an electric furnace; otherwise ceiling prices shall not exceed price established for Grade 10.
(3) Prices established for Grade 28 may be charged only when sold to a producer of wrought iron; otherwise ceiling price shall not exceed ceiling price for corresponding grade of basic open-hearth.
(4) Premiums for Grades 11-18, 20 and 21 may be charged only when sold for use in electric and open-hearth furnaces or foundries.
(5) Prices for Grade 29 may be charged only when sold for forging or rerolling purpose.

Special Pricing Provisions

(1) Sellers of Grades 26 and 27 may make an extra charge of $1.50 per ton for loading in box cars, or 75 cents per ton for covering gondola cars with a weather-resistant covering.
(2) Ceiling price of pit scrap, ladle scrap, salamander scrap, skulls, skimmings or scrap recovered from slag dumps and prepared to charging box size, shall be computed by deducting from the price of No. 1 heavy melting steel of dealer and industrial origin, the following amounts: Where iron content is 85% and over, $6; 75% and over, $10; less than 75%, $12.
(3) Ceiling price of any inferior grade of scrap not listed shall not exceed the price of No. 1 heavy melting steel less $15.

Differentials from Base

Differentials per gross ton above or below the price of Grade 1 (No. 1 railroad heavy melting steel) for other grades of railroad steel scrap.

2. No. 2 Heavy melting Steel	—$2.00
3. No. 2 Steel Wheels	Base
4. Hollow Bored Axles and loco. axles with keyways between the wheelseats.	Base
5. No. 1 Busheling	— 3.50
6. No. 1 Turnings	— 3.00
7. No. 2 Turnings, Drillings & Borings	—12.00
8. No. 2 Cast Steel and uncut wheelcenters	— 6.00
9. Uncut Frogs, switches.	Base
10. Flues, Tubes & Pipes	— 8.00
11. Structural, Wrought Iron and/or steel, uncut	— 6.00
12. Destroyed Steel Cars	— 8.00
13. No. 1 Sheet Scrap	— 9.50
14. Scrap Rails, Random Lengths	+ 2.00
15. Rerolling Rails	+ 7.00
Cut Rails:	
16. 3 feet and under	+ 5.00
17. 2 feet and under	+ 6.00
18. 18 inches and under	+ 8.00
19. Cast Steel, No. 1	+ 3.00
20. Uncut Tires	+ 2.00
21. Cut Tires	+ 5.00
Bolsters & Side Frames:	
22. Uncut	Base
23. Cut	+ 3.00
24. Angle, Splice Bars & Tie Plates	+ 5.00
25. Solid Steel Axles	+12.00
26. Steel Wheels, No. 3 oversize	Base
27. Steel Wheels, No. 3	+ 5.00
28. Spring Steel	+ 5.00
29. Couplers & Knuckles	+ 5.00
30. Wrought Iron	+ 8.00
31. Fireboxes	— 8.00
32. Boilers	— 6.00
33. No. 2 Sheet Scrap	—13.00
34. Carsides, Doors, Car Ends, cut apart	— 6.00

Restrictions on Use

(1) Price established for Grade 15 may be charged only when purchased and sold for rerolling uses; otherwise, ceiling shall not exceed that for Grade 14.
(2) Price established for Grade 30 may be charged only when sold to a producer of wrought iron; otherwise, ceiling shall not exceed that for No. 1 heavy melting steel.
(3) Price for Grade 25 may be charged only when sold for rerolling and forging purposes; otherwise ceiling shall not exceed that for base grade (No. 1).

CAST IRON SCRAP

Ceiling price per gross ton for following grades shall be f.o.b. shipping point:

Cast Iron:	
1. No. 1 (Cupola)	$49.00
2. No. 2 (Charging Box)	47.00
3. No. 3 (Hvy. Breakable	45.00
4. No. 4 (Burnt Cast)	41.00
5. Cast Iron Brake Shoes.	41.00
6. Stove Plate	46.00
7. Clean Auto Cast	52.00
8. Unstripped Motor Blocks	43.00
9. Wheels, No. 1	47.00
10. Malleable	55.00
11. Drop Broken Machinery.	52.00

Restrictions on Use

(1) Ceiling shipping point price which a basic open-hearth consumer may pay for No. 1 cast iron, clean auto cast, malleable or drop broken machinery cast shall be ceiling price for No. 3 cast iron.
(2) Ceiling shipping point price which any foundry other than a malleable iron producer may pay for Grade 10 shall be ceiling price for No. 1 cast iron.

Preparation Charges

Ceiling fees per gross ton which may be charged for intransit preparation of any grade of steel scrap of dealer or industrial origin authorized by OPS are:

(1) For preparing into Grades No. 1, No. 2 or No. 3, $8.
(2) For hydraulically compressing Grade No. 4, $6 per ton; Grade No. 5, $8.
(3) For crushing Grade No. 6, $3.
(4) For preparing into Grade No. 25, $6.
(5) For preparing into Grade No. 19, $6.
(6) For preparing into Grades No. 12, No. 13, No. 14, No. 16, or No. 20, $10.
(7) For preparing into Grade No. 17 or Grade No. 21, $11.
(8) For preparing into Grade No. 18 or Grade No. 20, $12.
(9) For hydraulically compressing Grade No. 15, $8.
(10) For preparing into Grade No. 28, $10.

Ceiling fees per gross ton which may be charged for intransit preparation of any grade of steel scrap of railroad origin shall be:

(1) For preparing into Grade No. 1 and Grade No. 2, $8.
(2) For hydraulically compressing Grade No. 13, $6.
(3) For preparing into Grade No. 16, $4.
(4) For preparing into Grade No. 17, $5.
(5) For preparing into Grade No. 18, $7.
(6) For preparing into Grade No. 21, $4.
(7) For preparing into Grade No. 23, $4.

Ceiling fees per gross ton which may be charged for intransit preparation of cast iron are limited to:

(1) For preparing Grade No. 8 into grade No. 7, $9.
(2) For preparing Grade No. 3 into Grade No. 11, $7.
(3) For preparing Grade No. 3 into Grade No. 1, $4.

Whenever scrap has arrived at its point of delivery and consumer engages a dealer to prepare such scrap, no fee may be charged for such services unless consumer obtains prior written OPS approval.

Commissions

No commissions shall be payable to a broker in excess of $1.

Unprepared Scrap

For unprepared scrap, other than materials suitable for hydraulic compression, ceiling basing point prices shall be $8 per ton beneath ceiling of the prepared base grades.
For unprepared material which when compressed constitutes No. 1 bundles, ceiling basing point prices shall be $6 per ton beneath ceiling for No. 1 bundles; or when compressed constitutes No. 2 bundles ceiling basing point price shall be $8 beneath ceiling basing point price for No. 2 bundles.

Premiums for Alloy Content

No premium may be charged for alloy content except: $1.25 per ton for each 0.25% of nickel where scrap contains not less than 1% and not over 5.25% nickel; $2 per ton for scrap containing not less than 0.15 per cent molybdenum and $3 for scrap containing not less than 0.65% molybdenum; for scrap containing not less than 10% manganese, $4 for scrap in sizes larger than 12 x 24 x 8 in., and $14 for scrap cut in that size or smaller (applicable only if scrap is sold for electric furnace uses or on NPA allocation); $1 for scrap conforming to SAE 52100.

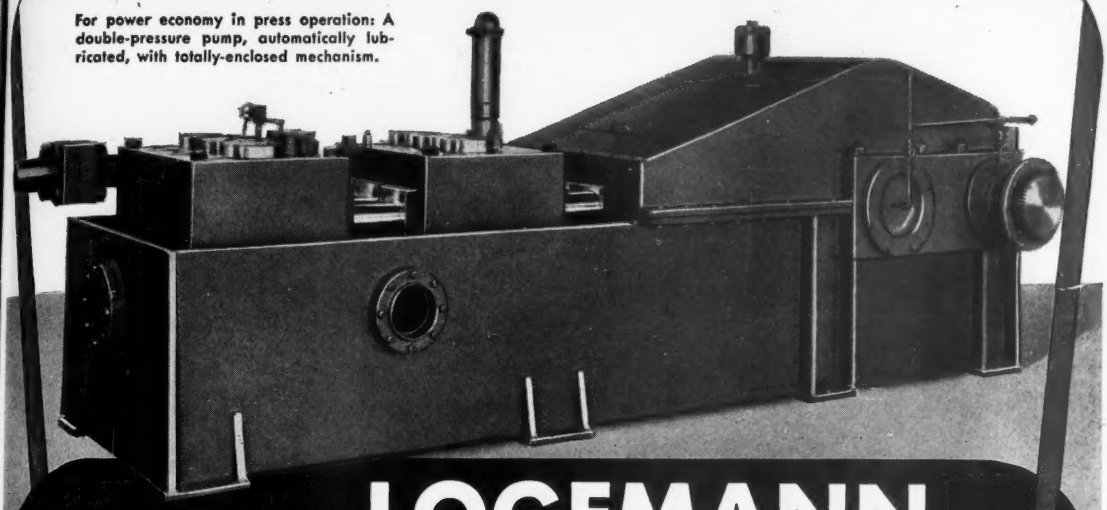
Switching Charges

Switching charges to be deducted from basing point prices of dealer, industrial and nonoperating railroad scrap, to determine ceiling shipping point prices for scrap originating in basing points are per gross ton:
Alabama City, Ala., 43c; Ashland, Ky., 47c; Atlanta, 51c.
Bethlehem, Pa., 52c; Birmingham, 50c; Brackenridge, Pa., 53c; Buffalo, 83c; Butler, Pa., 65c.
Canton, O., 51c; Chicago (including Gary, Ind.), $1.34; Cincinnati (including Newport, Ky.), 65c; Claymont, Del. (including Chester, Pa.), 79c; Cleveland, 76c.
Coatesville, Pa., 50c; Conshohocken, Pa., 20c.
Detroit, 95c; Duluth, Minn., 50c.
Harrisburg, Pa., 51c; Houston, Tex., 57c.
Johnstown, Pa., 75c.
Kansas City, Mo., 78c; Kokomo, Ind., 51c.
Middletown, O., 26c; Midland, Pa., 75c; Minnequa, Colo., 33c; Monessen, Pa., 51c.
Phoenixville, Pa., 51c; Pittsburg, Calif., 65c; Pittsburgh (including Bessemer, Homestead, Duquesne, Munhall), 99c; Portland, Oreg., 52c; Portsmouth, O., 51c.
St. Louis (including Federal, Granite City, E. St. Louis, Madison, Ill.), 51c; San Francisco (including So. San Francisco, Niles, Oakland), 66c; Seattle, 59c; Sharon, Pa., 75c; Sparrows Point, Md., 20c; Steubenville, O., 51c.
Warren, Pa., 75c; Weirton, W. Va., 70c.
Youngstown, 75c.

HAMILTON, ONT.
(Delivered Prices)

Heavy Melt.	$35.00
No. 1 Bundles	35.00
No. 2 Bundles	34.00
Mechanical Bundles	33.00
Mixed Steel Scrap	31.00
Mixed Borings, Turnings	28.00
Rails, Remelting	35.00
Rails, Rerolling	38.00
Busheling	29.50
Bushelings new factory, prep'd.	33.00
Bushelings new factory, unprep'd.	28.00
Short Steel Turnings	28.00
Cast Iron Grades*	
No. 1 Machinery Cast	58.00-60.00

* F.o.b. shipping point.



For power economy in press operation: A double-pressure pump, automatically lubricated, with totally-enclosed mechanism.

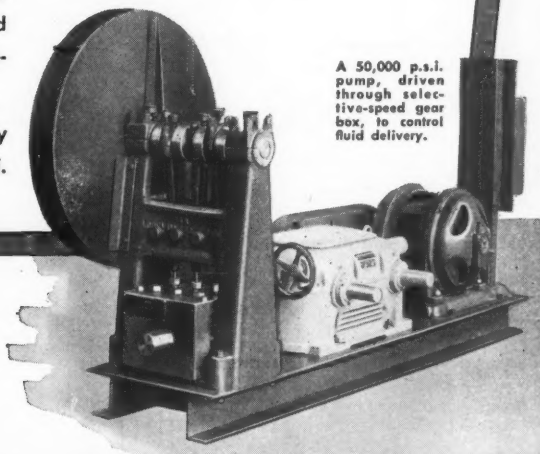
LOGEMANN HYDRAULIC PRESSURE PUMPS

Absolute Reliability... Maximum Delivery... Low Maintenance Cost...and Smooth Operation

Logemann Brothers offer a complete line of specially-designed High Pressure Pumps in a wide range of sizes featuring both single and double pressure types. Both vertical and horizontal styles are proving highly successful in press and accumulator operations and for hydrostatic test purposes.

Pressures range from approximately 2,000 p.s.i. to in excess of 50,000 p.s.i.

When making inquiries will you please include your pressure and gallonage requirements and indicate the type of application.



A 50,000 p.s.i. pump, driven through selective-speed gear box, to control fluid delivery.

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*"Another Caravan Axle!"

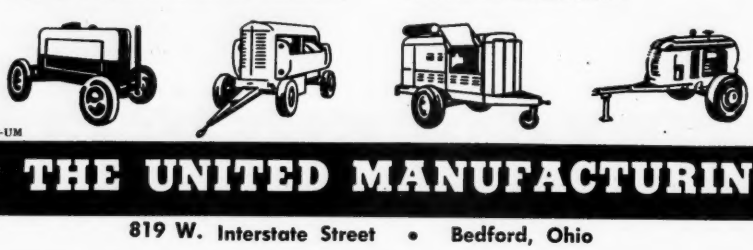
In Amsterdam or Albuquerque . . . it's performance that counts! And CARAVAN axles are recognized *around the world* for their outstanding performance.

Sturdy and dependable, United CARAVAN axles provide mobility for compressors, military equipment, fire-fighting apparatus, pumps, concrete mixers, welders, generators and many other diversified types of portable equipment weighing up to 12,000 pounds.

Both single axle (2-wheel) assemblies and 4-wheel running gear equipped with automotive-type steering are available to meet a wide range of requirements. In addition, units of either straight or drop-type construction can be supplied.

CARAVAN axles have gained world-wide recognition, as the Dutch boy's exclamation indicates, because of their versatility and dependable performance.

Write today for United's 12-page, illustrated CATALOG NO. 101. This catalog contains specifications on the complete line of CARAVAN axles and describes an automatic surge-control braking device, a retractable third-wheel assembly for 2-wheel units and other CARAVAN accessories.



229-UM

THE UNITED MANUFACTURING CO.

819 W. Interstate Street • Bedford, Ohio

The Metal Market

Government releasing 25,000 tons of copper from its stockpile for defense needs to combat present shortage. Labor unrest threatens to reduce flow of metal to consumers

LABOR unrest in the copper industry threatens to reduce drastically the flow of metal and its products to consuming plants. Industry-wide strike action by the International Union of Mine, Mill & Smelter Workers is scheduled for Aug. 27. The Connecticut Valley brass industry has been disrupted for weeks by disagreement over union contracts.

As a result of the acute shortage of copper, release, on a loan basis, of up to 25,000 tons of copper from the national stockpile for defense needs has been authorized by President Truman. The copper is to be released by the Munitions Board, as needed, to the General Services Administration for sale in accordance with allocations of the National Production Authority. Ten thousand of the 25,000 tons have been released thus far.

The release was granted with the understanding that the stockpile will be reimbursed by an equal amount by June 30, 1952, unless this replacement would not be in the interest of national defense.

Strike Loss—It is estimated that the strike at the Garfield, Utah, plant of American Smelting & Refining Co. brought a loss averaging more than 10,000 tons a month. This was the major factor in the present factor between production and imports on the one hand and absolute requirements on the other.

Stocks of refined copper at the end of July amounted to 68,045 tons, an increase of 7133 tons for the month. Production of refined copper declined to 93,258 tons from 105,127 tons in June while deliveries to fabricators were cut to 101,095 tons from 114,103 in June. Production of crude copper dropped to only 77,624 tons at primary plants and to 5094 tons at secondary smelters.

Copper wire and cable producers will be helped in solving their scheduling problems by a pending direction to order M-11. This direction will allow producers greater latitude in scheduling authorized controlled materials (ACM) orders. It is expected that the proposed direction will minimize disruption of normal customer-supplier relationships. Under the suggested regulation, distributors, with certain limitations, would be permitted to replace materials shipped on ACM orders by placing certified orders with copper wire mills.

A tailored pricing regulation for the wire and cable industry is being prepared. The proposed regulation would cover sales at the producer level and would include bare and insulated copper wire and cable for electrical and mechanical uses, bare and insulated copper base alloy wire and cable for electrical use, insulated aluminum wire, copper weld steel wire, wire assemblies, cord sets, power supply cords, battery and ignition cable sets, and certain end cable accessories.

Titanium Output Increasing

Titanium production may approximate 500,000 tons annually within 20 years, equivalent to about the present output of stainless steel, predicts S. I. Bradford, an official of Rem-Cru Titanium Inc. This company is owned jointly by Crucible Steel Co. of America and Remington Arms Co. Inc.

Titanium output is now estimated at 700 ingot tons a year. Rem-Cru expects to expand its plant facilities at Midland, Pa. The company now is making 500-pound ingots and hopes to be turning out ingots weighing 1200 pounds.

Plans Magnesium Rolling Mill

Brooks & Perkins Inc., Detroit, is constructing a magnesium rolling mill northwest of that city. Equipment has been purchased and contracts awarded for the first unit which will consist of a hot mill and two cold mills. Rolling operations are to start in January, 1952.

For the present, fabricating work will be continued at the company's main plant on W. Fort St., Detroit. The new facilities will permit rolling to exact sizes and gages required for fabrication, rather than being dependent on the limited stock sizes available which often involve as much as 50 per cent waste in cutting the required blanks.

NPA Prepares Magnesium Order

An order regulating the acceptance and scheduling of defense orders for magnesium, magnesium alloys and magnesium products is being prepared by National Production Authority. Under the proposed regulation, magnesium producers and fabricators would be required to accept up to a stated percentage of their scheduled monthly production of specified items to meet defense requirements. The percentage would vary for different forms of magnesium, depending on defense demands.

Other provisions of the suggested order would: Make the output of government-owned plants available for defense orders only in accordance with contract requirements of the General Services Administration; establish a 60-day lead time within which producers and fabricators would be required to place defense orders; provide for NPA assistance in placing orders which could not be placed with normal sources of supply due to certain provisions of the order.

The supply of magnesium is barely adequate to meet current requirements and this situation probably will continue for the remainder of 1951, NPA says. Six of the seven magnesium plants ordered reactivated by the Munitions Board are now in operation and production is increasing at each plant. It is expected that supplies of magnesium eventually will match requirements. Another favorable development in the magnesium supply situation, NPA said, is the availability of sufficient materials, including artificial graphite electrodes, to permit all plants to increase their production as scheduled.

Enters Wire Screening Field

Keystone Lime Works Inc., Keystone, Ala., has started construction of a plant for production of aluminum wire screening. No details as to the size of the plant or the number to be employed were immediately available.

Officials of the company are W. V. Hammond Sr., president; K. L. Hammond, vice president; H. V. Hammond Jr., vice president; E. L. Purdy Jr., secretary.

Antimony Output Declines

Domestic mine production of antimony declined 56 per cent in May to only 163 net tons, or 127 tons less than the monthly average for first quarter of the year, reports the Bureau of Mines. Smelter production was 894 tons, or 26 per cent lower than in April. Production of secondary antimony increased to 1900 tons in May from 1849 in April. Consumption of primary antimony was 1438 tons during May, an increase of 6 per cent from the April figure, but was still 10 per cent below the monthly average for the first quarter of 1951. Stocks held by producers, dealers, and consumers on May 31 were 6666 tons, an increase of 2 per cent from a month earlier.

Aluminum Product Shipments

Shipments of aluminum sheet and plate by member companies of Aluminum Association's Sheet Division dropped slightly from 90,855,584 pounds for May to 87,501,761 pounds in June, reports Donald M. White, secretary. The second quarter total was about 11 per cent under the first quarter shipments. Compared with the first half of 1950, the 579,092,988 pounds of sheet and plate shipped during the first half of 1951 showed a 9 per cent rise. Shipments of permanent-mold rough castings by the Foundry Division in the second quarter totaled 8,976,403 pounds, valued at $5,289,127, compared with 10,256,059 pounds, valued at $5,839,093, in the first quarter. Shipments of foil in the second quarter amounted to 25,051,383 pounds compared with 27,702,255 pounds in the first quarter.

A shortage of scrap is causing sharp curtailments in production of secondary aluminum ingot, especially in the Mid-west.

NONFERROUS METALS

(Cents per pound, carlots, except as otherwise noted)

Primary Metals

Copper: Electrolytic 24.50c. Conn. Valley; Lake 24.62½c, delivered.

Brass Ingots: 85-5-5-5 (No. 115) 29.00c; 88-10-2 (No. 215) 38.50c; 80-10-10 (No. 305) 34.00c; No. 1 yellow (No. 405) 25.50c.

Zinc: Prime western 17.50c; brass special 17.75c; intermediate 18.00c. East St. Louis; high grade 18.85c, delivered.

Lead: Common 16.80c; chemical 16.90c; corroding 16.90c, St. Louis.

Primary Aluminum: 99% plus, ingots 19.00c, pigs 18.00c. Base prices for 10,000 lb and over. Freight allowed on 500 lb or more but not in excess of rate applicable on 30,000 lb. c.l. orders.

Secondary Aluminum: Piston alloys 20.50c; No. 12 foundry alloy (No. 2 grade) 19.50c; steel deoxidizing grades, notch bars, granulated or shot: Grade 1, 18.00c; grade 2, 17.75c; grade 3, 17.25c; grade 4, 16.50c.

Magnesium: Commercially pure (99.8%) standard ingots, 10,000 lb and over 24.50c, f.o.b. Freeport, Tex.

Tin: Grade A, prompt 103.00.

Antimony: American 99-99.8% and over but not meeting specifications below 42.00c; 99.8% and over (arsenic 0.05% max.; other impurities 0.1% max.) 42.50c; f.o.b. Laredo, Tex., for bulk shipments.

Nickel: Electrolytic cathodes, 99.9%, base sizes at refinery, unpacked, 56.50c; 25-lb pigs, 59.15c; "XX" nickel shot, 60.15c; "F" nickel shot or ingots, for addition to cast iron, 56.50c. Prices include import duty.

Mercury: Open market, spot, New York, $195-$200 per 76-lb flask.

Beryllium-Copper: 3.75-4.25% Be, $1.56 per lb of alloy, f.o.b., Reading, Pa.

Cadmium: "Regular" straight or flat forms, $2.55 del.; special or patented shapes $2.80.

Cobalt: 97.99%, $2.10 per lb for 500 lb (kegs); $2.12 per lb for 100 lb (case); $2.17 per lb under 100 lb.

Gold: U. S. Treasury, $35 per ounce.

Silver: Open market, New York 90.16c per oz.

Platinum: $90-$93 per ounce from refineries.

Palladium: $24 per troy ounce.

Iridium: $200 per troy ounce.

Titanium (sponge form): $5 per pound.

Rolled, Drawn, Extruded Products

COPPER AND BRASS

(Base prices, cents per pound, f.o.b. mill; effective May 23, 1951)

Sheet: Copper 40.18; yellow brass 37.28; commercial bronze, 95% 40.18; 90% 39.78; red brass, 85% 38.86; 80% 38.47; best quality, 38.07; nickel silver, 18%, 50.99; phosphor-bronze grade A, 5%, 59.42.

Rod: Copper, hot-rolled 36.03; cold-drawn 37.28; yellow brass free cutting, 31.70; commercial bronze, 95%, 39.87; 90%, 39.47; red brass 85%, 38.55; 80%, 38.16.

Seamless Tubing: Copper 40.22; yellow brass 40.29; commercial bronze, 90%, 42.44; red brass, 85% 41.77.

Wire: Yellow brass 37.57; commercial bronze, 95%, 40.47; 90%, 40.07; red brass, 85%, 39.15; 80%, 38.76; best quality brass, 38.36.

Copper Wire: Bare, soft, f.o.b. eastern mills, c.l. 28.67-30.295; l.c.l. 29.17-30.92; 100,000 lb lots 28.545-30.295; weatherproof, f.o.b. eastern mills, c.l. 30.10, l.c.l. 30.18, 100,000 lb lots 29.35; magnet, del., 15,000 lb or more 34.50, l.c.l. 35.25.

ALUMINUM

(30,000 lb base; freight allowed on 500 lb or more, but not in excess of rate applicable on 30,000 lb c.l. orders)

Sheets and Circles: 2S and 3S mill finish c.l.

Thickness Range Inches	Widths or Diameters, In., Inc.	Flat Sheet Base*	Coiled Sheet Base	Coiled Sheet Circle† Base
0.249-0.136	12-48	30.1	...	...
0.135-0.096	12-48	30.6	...	...
0.095-0.077	12-48	31.2	29.1	33.2
0.076-0.061	12-48	31.8	29.3	33.4
0.060-0.048	12-48	32.1	29.5	33.7
0.047-0.038	12-48	32.5	29.8	34.0
0.037-0.030	12-48	32.9	30.2	34.6
0.029-0.024	12-48	33.4	30.5	35.0
0.023-0.019	12-36	34.0	31.1	35.7
0.018-0.017	12-36	34.7	31.7	36.6
0.016-0.015	12-36	35.5	32.4	37.6
0.014	12-24	36.5	33.3	38.9
0.013-0.012	12-24	37.4	34.0	39.7
0.011	12-24	38.4	35.0	41.2
0.010-0.0095	12-24	39.4	36.1	42.7
0.009-0.0085	12-24	40.6	37.2	44.4
0.008-0.0075	12-24	41.9	38.4	46.1
0.007	12-18	43.3	39.7	48.2
0.006	12-18	44.8	41.0	52.8

* Lengths 72 to 180 inches. † Maximum diameter, 26 inches.

Screw Machine Stock: 5000 lb and over.

Dia. (in.) or distance across flats	—Round— R317-T4, 17S-T4	R317-T4	—Hexagonal— 17S-T4
0.125	52.0	....	....
0.156-0.188	44.0	....	....
0.219-0.313	41.5	....	....
0.375	40.0	46.0	48.0
0.406	40.0	....	....
0.438	40.0	46.0	48.0
0.469	40.0	....	....
0.500	40.0	46.0	48.0
0.531	40.0	....	....
0.563	40.0	....	45.0
0.594	40.0	....	....
0.625	40.0	43.5	45.0
0.688	40.0	....	45.0
0.750-1.000	39.0	41.0	42.5
1.063	39.0	....	41.0
1.125-1.500	37.5	39.5	41.0
1.563	37.0	....	....
1.625	36.5	....	39.5
1.688-2.000	36.5	....	....

LEAD

(Prices to jobbers, f.o.b. Buffalo, Cleveland, Pittsburgh) Sheets: Full rolls, 140 sq ft or more $22.00 per cwt; add 50c cwt 10 sq ft to 140 sq ft. Pipe: Full coils $22.00 per cwt. Traps and bends: List prices plus 60%.

ZINC

Sheets, 24.50c, f.o.b. mill 36,000 lb and over. Ribbon zinc in coils, 23.00c, f.o.b. mill, 36,000 lb and over. Plates, not over 12-in., 23.50-24.50c; over 12-in., 23.50-24.50c.

"A" NICKEL

(Base prices f.o.b. mill)

Sheets, cold-rolled, 77.00c. Strip, cold-rolled, 83.00c. Rods and shapes, 73.00c. Plates, 75.00c. Seamless tubes, 106.00c.

MONEL

(Base prices, f.o.b. mill)

Sheets, cold-rolled 60.50c. Strip, cold-rolled 63.50c. Rods and shapes, 58.50c. Plates, 59.50c. Seamless tubes, 93.50c. Shot and blocks, 53.50c.

MAGNESIUM

Extruded Rounds, 12 in. long, 1.31 in. in diameter, less than 25 lb, 55.00-62.00c; 25 to 99 lb, 45.00-52.00c; 100 lb to 5000 lb, 41.00c.

TITANIUM

(Prices per lb, 10,000 lb and over, f.o.b. mill) Sheets, $15; sheared mill plate, $12; strip, $15; wire, $10; forgings, $6; hot-rolled and forged bars, $6.

Plating Materials

Chromic Acid: 99.9% flakes, f.o.b. Philadelphia, carloads, 27.00c; 5 tons and over 27.50c; 1 to 5 tons, 28.00c; less than 1 ton 28.50c.

Copper Anodes: Base 2000 to 5000 lb; f.o.b. shipping point, freight allowed: Flat untrimmed 37.69c; oval 37.19c. Cast 37.37½c, delivered in eastern territory.

Nickel Anodes: Rolled oval, carbonized, carloads, 68.50c; 10,000 to 30,000 lb, 69.50c; 3000 to 10,000 lb, 70.50c, 500 to 3000 lb 71.50c; 100 to 500 lb, 73.50c; under 100 lb, 76.50c; f.o.b. Cleveland.

Nickel Chloride: 100-lb kegs, 35.00c; 400-lb bbl. 33.00c; up to 10,000 lb, 32.50c; over 10,000 lb, f.o.b. Cleveland, freight allowed on barrels or 4 or more kegs.

Sodium Stannate: 25 lb cans only, less than 100 lb, to consumers 77.7c; 100 or 350 lb drums only, 100 to 600 lb, 63.1c; 700 to 1900 lb, 60.6c; 2000 to 9900 lb, 58.9c. Freight allowed east of Mississippi and north of Ohio and Potomac rivers.

Tin Anodes: Bar, 1000 lb and over, $1.19; 500 to 999 lb, $1.195; 200 to 499 lb, $1.20; less than 200 lb, $1.215. Freight allowed east of Mississippi and north of Ohio and Potomac.

Zinc Cyanide: 100 lb drums, less than 10 drums 47.7c, 10 or more drums, 45.7c, f.o.b. Niagara Falls, N. Y.

Stannous Sulphate: 100 lb kegs or 400 lb bbl, less than 2000 lb $1.0009; more than 2000 lb, 98.09c. Freight allowed east of Mississippi and north of Ohio and Potomac rivers.

Stannous Chloride (Anhydrous): In 400 lb bbl, 87.23c; 100 lb kegs 88.23c. Freight allowed.

Scrap Metals

Brass Mill Allowances

Ceiling prices in cents per pound for less than 20,000 lb, f.o.b. shipping point, effective June 26, 1951.

	Clean Heavy	Rod Ends	Clean Turnings
Copper	21.50	21.50	20.75
Yellow Brass	19.125	18.875	17.875
Commercial Bronze			
95%	20.50	20.25	19.75
90%	20.50	20.25	19.75
Red Brass			
85%	20.25	20.00	19.375
80%	20.125	19.875	19.375
Muntz metal	18.125	17.875	17.375
Nickel silver, 10%	21.50	21.25	10.75
Phos. bronze, A	27.00	26.75	25.75

Copper Scrap Ceiling Prices

(Base prices, cents per pound, less than 40,000 lb f.o.b. point of shipment)

Group I: No. 1 copper 19.25; No. 2 copper wire and mixed heavy 17.75; light copper 16.50; No. 1 borings 19.25; No. 2 borings 17.75; refinery brass, 17.00 per lb of dry Cu content for 50 to 60 per cent material and 17.25 per lb for over 60 per cent material.

Group II: No. 1 soft red brass solids 19.50; No. 1 composition borings 19.25 per lb of Cu content plus 83 cents per lb of tin content; mixed brass borings 19.25 per pound of Cu content plus 78 cents per lb of tin content; unlined red car boxes 19.25; lined red car boxes 18.25; cocks and faucets 16.75; mixed brass screens 16.00; zincy bronze solids and borings 16.25.

Zinc Scrap Ceiling Prices

(Cents per pound, f.o.b. point of shipment)

Unsweated zinc dross, 12.25c; new clippings and trimmings, 14.50; engravers' and lithographers' plates, 14.50c; die cast slabs, min. 90% zinc, 12.25; old zinc scrap, 11.25c; forming and stamping dies, 11.25; new die cast scrap, 10.75; old zinc die cast radiator grills, 10.50; old die cast scrap, 9.50c.

Lead Scrap Ceiling Prices

(F.o.b. point of shipment)

Battery lead plates, 17.00c per lb of lead and antimony content, less smelting charge of 2 cents per lb of material in lots 15,000 lb or more; less 2.25c in lots less than 15,000 lb. Used storage batteries (in boxes) drained of liquid, 6.60c for 15,000 lb or more; 6.40c for less than 15,000 lb. Soft lead scrap, hard lead scrap, battery slugs, cable lead scrap or lead content of lead-covered cable scrap, 15.25c per lb. In addition, brokerage commissions are permitted.

Aluminum Scrap Ceiling Prices

(Cents per pound, f.o.b. point of shipment, less than 5000 lb)

Segregated plant scrap: 2s solids, copper free, 10.50, high grade borings and turnings, 8.50; No. 12 piston borings and turnings, 7.50; Mixed plant scrap: Copper-free solids, 10.00 dural type, 9.00; Obsolete scrap: Pure old cable, 10.00; sheet and sheet utensils, 7.25; old castings and forgings, 7.75; clean pistons, free of struts, 7.75; pistons with struts, 5.75.

DAILY PRICE RECORD

1951	Copper	Lead	Zinc	Tin	Aluminum	Antimony	Nickel	Silver
Aug. 1-23	24.50	16.80	17.50	103.00	19.00	42.00	56.50	90.16
July 2-31	24.50	16.80	17.50	106.00	19.00	42.00	56.50	90.16
June 28-30	24.50	16.80	17.50	106.00	19.00	42.00	56.50	90.16
June 18-27	24.50	16.80	17.50	106.00	19.00	42.00	56.50	87.75
June 15-16	24.50	16.80	17.50	111.00	19.00	42.00	56.50	87.75
July Avg.	24.50	16.80	17.50	106.00	19.00	42.00	56.50	90.16
June Avg.	24.50	16.80	17.50	117.962	19.00	42.00	56.50	88.492
May Avg.	24.50	16.80	17.50	139.923	19.00	42.00	50.50	90.16
Apr. Avg.	24.50	16.80	17.50	145.735	19.00	42.00	50.50	90.16
Mar. Avg.	24.50	16.80	17.50	145.730	19.00	42.00	50.50	90.16
Feb. Avg.	24.50	16.80	17.50	182.716	19.00	42.00	50.50	90.16
Jan. Avg.	24.50	16.80	17.50	171.798	19.00	35.462	50.50	88.890

NOTE: Copper: Electrolytic, del. Conn. Valley; Lead, common grade, del. St. Louis; Zinc, prime western, E. St. Louis; Tin, Straits, del. New York; Aluminum primary ingots, 99%, del; Antimony, bulk, f.o.b. Laredo, Tex.; Nickel, electrolytic cathodes, 99.9%, base sizes at refinery unpacked. Silver, open market, New York. Prices, cents per pound; except silver, cents per ounce.

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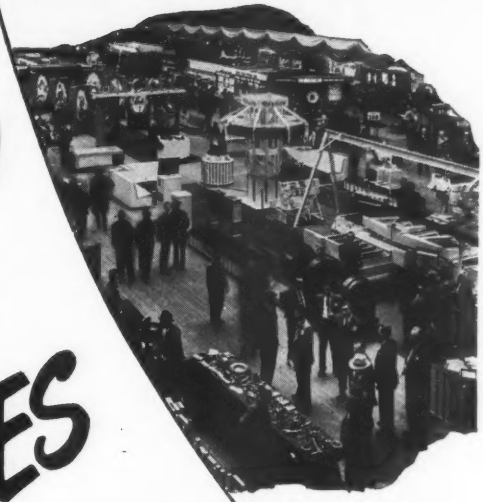

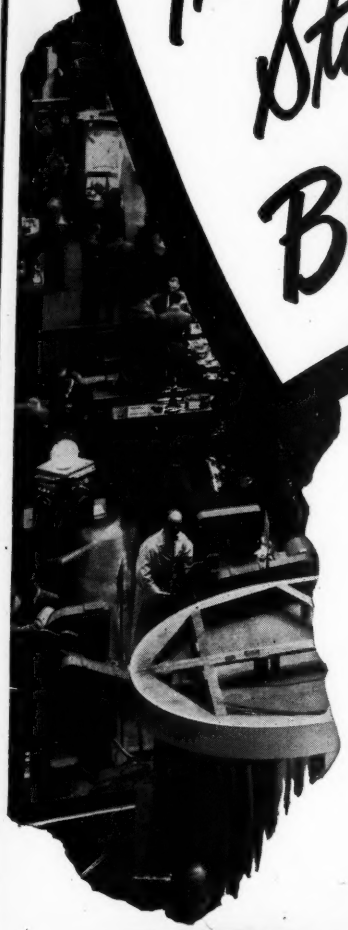

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Sheets, Strip . . .

Sheet and Strip Prices, Page 123 & 124

Cleveland — Some of the confusion in the sheet market is expected to be eliminated as result of NPA's revision of its basic steel order M-1 permitting steelmakers to accept a large share of their orders from their regular customers after military needs are booked. Under the amended order, except for military orders, sheetmakers can accept or reject CMP tickets without regard to date of receipt until 15 days prior to expiration of established lead time. This means the first-come first-served basis for accepting CMP orders, which has prevailed up to now, is out except for the last 15 days of the leadtime, thus assuring consumers time in which to get their orders entered on books of their regular mill sources.

Boston—Frequent revisions in production and distribution orders hamper scheduling of flat-rolled tonnage with normal lead-time shortened. Directives within directives are appearing and tentatively scheduled volume is often displaced.

Philadelphia — Minimum delivered prices here on hot, cold and galvanized sheets will reflect the higher rail freight charge, effective Aug. 28, from Sparrows Point, Md., of .3161c per pound on 40,000-pound carlots. Thus with a mill price of 3.60c Sparrows Point, the delivered price on hot sheets will be 3.9161c, with a mill price of 4.35c, cold-rolled will be 4.6661c, and with a base of 4.80c, galvanized will be 5.1161c.

Cincinnati — Sheet mills face demands for tonnage far beyond production limits. Proffers of tonnage continue heavy although books are choked with CMP business and indicated carryover into fourth quarter will aggravate shortages.

Chicago — A local sheetmaker has been granted freedom of action in its scheduling during September to offset cancellations of electrical sheets and a reduction in galvanized sheet production because of zinc shortage.

St. Louis—CMP-rated requests for cold-rolled sheets are picking up in anticipation of CMP becoming closed-end by Nov. 1. Overloaded district mills, whose CMP set-aside averages about 55 per cent, have long been rejecting tickets.

Birmingham—Although sheet mills hesitate to estimate the supply situation in advance of probable CMP changes, there is no indication of any early change in the severity of the current shortage.

Semifinished Steel . . .

Semifinished Prices, Page 123

Pittsburgh — Work is being completed on No. 35 and No. 36 open hearths at Jones & Laughlin Steel Corp.'s South Side plant here. Eleven 250-ton open hearths are under construction at the works. All were designed and are being constructed by Loftus Engineering Corp. Steel is scheduled to be tapped in October from No. 35 and No. 36. Of the nine remaining furnaces, two will go into operation in November, two in December and the remainder early next year. Loftus also is erecting two open hearths at Jones & Laughlin's Otis works in Cleveland.

Tin Plate . . .

Tin Plate Prices, Page 124

Pittsburgh—Most consumers have placed fourth quarter requirements pending final allotment which is expected to hold unchanged from third quarter. Shift toward lighter coatings results in greater use of electrolytic plate. Tin plate is probably the one product not over-validated.

Steel Bars . . .

Bar Prices, Page 123

New York—Bar consumers are expected to absorb increases in railroad freight charges effective Aug. 28. These increases will bring the charges from Johnstown, Pa., to New York up to 58.86 cents per hundred pounds for 40,000 pound lots, against 56 cents currently; from Buffalo 63.22 cents against 63 cents (that is, as soon as the charges are ratified for intra-state shipments); and from Pittsburgh, 67.50 cents against 64 cents.

Boston—Users of carbon bars in some cases look for more tonnage under CMP next quarter. In general there appears to be too much bar steel allocated for fourth quarter in relation to potential output. This applies to alloys especially. Some boron alloy steel is being substituted for higher molybdenum grades.

Philadelphia — Minimum delivered price here on hot carbon bars is scheduled to be increased to 4.2232c Aug. 28, reflecting the new rail freight tariff. The governing base at Johnstown, Pa., is 3.70c, and the proposed rate from that point will be .5232c per pound on carlots of 40,000 pounds. The new rate from Pittsburgh will be .5886c and from Buffalo .6322c.

Pittsburgh—Fourth quarter books are filled at most mills on the basis of existing set-asides. Cold-finished bar consumers will be hardest hit in fourth quarter. Alloy bar situation appears somewhat better but considerable shopping is required to obtain material.

Cleveland — Tight bar supply conditions are expected to continue right into first quarter next year. Bars figure prominently in direct military requirements and consequently there is little chance supplies will become freer in coming months with the military program steadily growing. The bar mills are virtually booked to capacity for fourth quarter on validated tonnage though, it is understood, a few openings have been held for directives.

Chicago—Future outlook for cold-finished steel bars is improved by NPA action in directing steelmakers to supply finishers with hot-rolled bar tonnage equivalent to 110 per cent of base period for first six months next year.

Los Angeles — Cold-drawers hope directives will gain them fourth quarter hot-bar needs. Uncertain hot-bar deliveries prevent them from booking orders beyond October.

Wire . . .

Wire Prices, Page 125

Boston—Slackening in orders for screws has not resulted in any easing in demand for heading wire. While some screwmakers have larger steel inventories, these are unbalanced and fourth quarter allotments under CMP lag behind normal lead-time. Alloys are hard to get in sizes and grades wanted. Some boron alloys are being successfully used in half-inch heading wire for fasteners.

Plates . . .

Plate Prices, Page 123

Philadelphia—Proposed amendment to M-1 permitting steel mills to accept or reject CMP orders regardless of date of receipt until 15 days prior to expiration of lead-time, will not change the situation much this year as regards plates. The plate mills already are booked to the limit of set-asides for the entire fourth quarter.

Construction of two tankers for the Sun Oil Co. will begin in fourth quarter at the Sun Shipbuilding & Dry Dock Co., Chester, Pa. Each will require 6800 tons of plates and 1200 tons of shapes and bars.

Effective Aug. 28 minimum delivered price here on plates will be 4.0161 cents per pound on 40,000 pound carlots. This will reflect the increase in freight rates and is predicated on a mill price of 3.70c, Sparrows Point, Md., and a .3161c rail charge. Producers nearer have higher mill prices. Incidentally, the new rail charges to Philadelphia from Claymont, Del., and Conshohocken, Pa., will be .0981c. and from Coatesville, Pa., .1635c. Mill prices at these points are 4.15c.

Boston—Except for small openings for contingencies plate mills are booked through fourth quarter with directives and CMP tonnage. Demand for floor plates and clad material is heavy.

New York — Minimum delivered prices on plates here will be advanced to 4.1578c per pound on carlots of 40,000 pounds, effective Aug. 28. This will reflect a new rate of .4578c from Sparrows Point, the governing base for this district with a mill price of 3.70c.

Pittsburgh — Strong demand for plates continues. Inquiries with CMP backing are turned down for fourth quarter as most producers hold directives in excess of their producing potential. Carryover from third quarter will contain directive orders and contribute to scheduling difficulties.

Chicago — No free plate tonnage will be available during fourth quarter. Up to now the set-aside for essential use on this product has been 95 per cent but platemakers have been instructed by telegram from NPA to withhold the remaining 5 per cent starting Oct. 1.

Seattle—Projects involving plates include 22 small oil storage tanks for Bonneville Administration, bids in, and 1400 tons for the Eklutna power tunnel, Alaska, rebids to Bureau of Reclamation, Denver, Sept 11.

Structural Shapes . . .

Structural Shape Prices, Page 123

New York — Featuring district structural steel awards is 3300 tons by the Bulova Watch Co. for a plant in Queens. The market here is quiet in general, reflecting limitations on the use of steel for office buildings and apartments. Relatively there is much less doing in this area than in certain others where industrial expansion is heavy and considerable bridge work is in active demand.

Effective Aug. 28, minimum delivered price here on shapes will be 4.0161c on carlots of 40,000 pounds. This will be predicated on the current mill price of 3.70c Bethlehem, Pa.

Boston — Inquiry for fabricated structurals is slower. Procurement of plain material to meet highest rated defense requirements under contract is a major production and distribution problem. Allotments for direct military plant expansion, fourth quarter approximate 250,000 tons with practically no tonnage left to apply against certificates granted and on which some work had been started. Highway construction, bridges included, has an allotment of 250,000 tons of steel, all types, including reinforcing. This is a decline of 50,000 tons from third quarter.

Buffalo — Steel shortage is causing a delay of several months in be-

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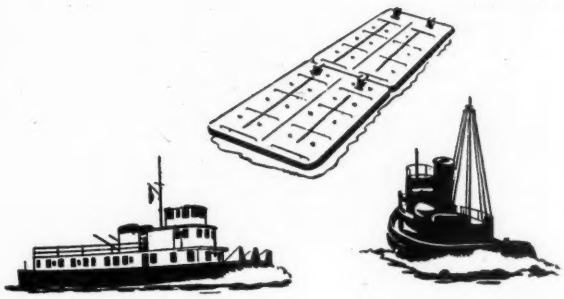

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ginning work on a government contract for steel barges. NPA has approved allotment of the needed steel but delivery has been delayed.

Philadelphia — Reduced allotments of structural steel for fourth quarter will not only limit the scope of new construction, but will retard work on projects under way, including steel expansion. Work on the $400 million plant of the United States Steel Co. at Morrisville, Pa., may be slowed down. Construction on this plant is possibly 16 per cent completed.

With railroad freight charges scheduled to increase Aug. 28, minimum delivered prices on shapes here will be 3.9180c per pound. This is predicated on a mill price of 3.70c, Bethlehem, Pa., plus a freight charge of .2180c per pound on 40,000-pound car lots.

Pittsburgh — Cutback suffered by steel expansion program reflects the huge current demand for structurals. All programs were cut 25 per cent for fourth quarter.

Chicago — Recent order of NPA scaling down fourth quarter allotments of structural steel for steel plant expansion may affect some projects recently put under way here.

Birmingham — Steel for fourth quarter fabrication is giving some concern to local plants, especially in view of continued and anticipated increase in demand for shapes of various descriptions.

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Los Angeles—Pinched by skyrocketing costs, California will curtail by 25 per cent its highway construction program. Paced by price increases in steel, construction costs in California have soared to an all-time high. Survey by the California Division of Highways of eight major contract items of highway construction disclosed highway construction costs have risen 238.3 per cent since 1940, 48.6 per cent since start of the Korean War, and 22.3 per cent during the first half of the current year. The analysis showed prices of reinforcing steel have risen 36.3 per cent to a current $210 per ton since start of Korean hostilities. During the same period contract prices for structural shapes rose 105 per cent to a current $322 per ton.

Seattle — Demand for shapes is strong. Fabricators are unable to accept many offers. Placement for public works is heavy. Several important projects in Alaska are pending.

Ferroalloys . . .

Ferroalloy Prices, Page 129

Washington — Tighter government control of 14 ferroalloy materials and products has been effected by NPA through issuance of order M-80. Under this new regulation the following metals are placed under complete allocation: Nickel, tungsten, cobalt, molybdenum, columbium and tantalum. Other ferroalloys covered by the order are boron, titanium, vanadium and zirconium.

Inventories are limited to 45 days except in the case of ferrosilicon and ferromanganese. Prohibitions are continued on use of alloy materials and others are added.

Warehouse . . .

Warehouse Prices, Page 129

Philadelphia — Under the government price freeze, warehouses will be called upon to absorb the increased rail freight charges, effective Aug. 28. They absorbed the 4 per cent increase Apr. 4, and under similar circumstances. The increase this week will be an additional 5 per cent of the original.

Pittsburgh—Warehouses are hampered by limited receipts. While assured 85 per cent of their base period receipts by NPA, most distributors claim the base period is unrepresentative of their normal volume.

Cleveland — Warehouses expect increased demand pressure with the vacation season on the wane. Pickup is anticipated after Labor Day but limited stocks will necessitate continued careful doling out of tonnage to customers. While the distributors are assured receipts from the mills of at least 85 per cent of the tonnage they took in during the base period, first nine months of 1950, the fact there will be little if any "free" tonnage available in fourth quarter will result in a drop in their overall tonnage. The warehouses have been receiving substantial tonnage in the "free" market.

Seattle—Warehouse volume is well maintained. Demand for some items has slackened slightly as CMP allot-

ments are in excess of current inventories.

Tubular Goods . . .

Tubular Goods Prices, Page 127

Seattle—Cast iron pipe demand is seasonally normal but competing types are making inroads as cast iron deliveries are six months in the future.

Metallurgical Coke . . .

Metallurgical Coke Prices, Page 127

Cleveland — Easier tone prevails in the oven foundry coke trade. Pressure of demand from the foundries is not so much in evidence as earlier in the year. Vacation shutdowns permitted the foundries to build stocks to some extent and while most shops are back in operation, production schedules have not regained the prevacation pace in some instances. To some extent this reflects slower demand for castings for civilian goods not yet fully offset by increased requirements on defense and related account. Increase in freight rates, which goes into effect Aug. 28, will raise the Cleveland delivered price on oven foundry coke from $25.75 to $25.82.

Pig Iron . . .

Pig Iron Prices, Page 122

Cleveland — Merchant pig iron suppliers expect increased pressure from consumers right after Labor Day. Ending of the vacation season, along with expanding demand for castings on military account, is believed certain to spur customers' procurement efforts. Throughout the summer months, while overall demand for iron has taxed furnaces to capacity, the foundries have not been pressing for tonnage like they had been earlier in the year. Through careful alloting of tonnage, sellers have been able to keep the foundries adequately supplied to support their current melts. Few foundries have been able to acquire as much as 30-days' inventory permitted under government regulations.

Boston — Basic iron supply stringency in this area is more critical than that in foundry grades. Consumers are paying close to $80 per ton delivered plant for foreign iron in some cases. Substantial volume of foreign tonnage is required to maintain operations. Most foundries are getting enough iron to support melting schedules. Some report their inventory position improved. Demand pressure from textile mill equipment builders is easier. In a few instances melting schedules are off. Defense needs run to no more than 40 per cent with most foundries. Exceptions include machine tool suppliers. One of the largest tool builders is down because of a strike. Builders Iron Foundry, Providence, R. I., booked orders for telescope mounts and castings for Frankford arsenal, Philadelphia, costing more than $250,000.

New York — New freight charges, effective Aug. 28, on pig iron from Bethlehem, Pa., the governing base for this district, to Brooklyn will be $4.6761 and to Newark, N. J., $2.8667. Thus the delivered prices to Brooklyn on No. 2 foundry will be $59.1761 and on malleable $59.6761; and to Newark on basic $56.8667, No. 2 foundry $57.3667, malleable $57.8667, and bessemer $58.3667.

Iron supply continues tight, with the possibility of further stringency.

Philadelphia—The Swedeland, Pa., producer will have more foundry iron for the merchant trade next month, but it will still be short of the volume usually supplied prior to the 30-day suspension of its smaller furnace around July 1. Despite some spottiness in iron casting demand, the foundries are still seeking more iron than is available.

With rail freight charges increasing Aug. 28, minimum delivered prices here on basic iron will be $56.6051, No. 2 foundry $57.1051, malleable $57.6051 and Bessemer $58.1051. These prices will be predicated on a freight charge of $2.6051 from Bethlehem, Pa., currently the governing base on these grades. Minimum delivered price on low phos will be $63.3681 based on a $60 price at Steelton, Pa., and a rail charge of $3.3681.

Pittsburgh — With United States Steel Co.'s Clairton No. 1 stack resuming operations Aug. 18, 52 of the district's 54 stacks are active. Jones & Laughlin Steel Corp.'s Eliza furnaces broke an all-time monthly rec-

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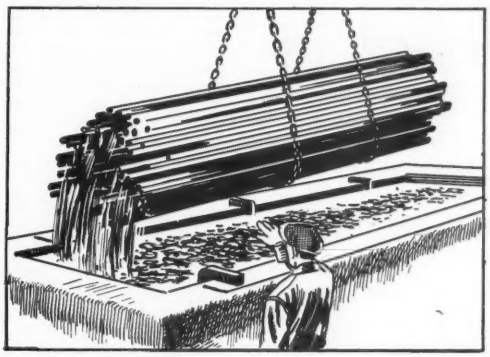

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Highland Bldg., Pittsburgh 6, Pa.

ord in July. Eliza furnaces are rated at 1.8 million tons annually. Demand for pig iron, all grades, will increase after Labor Day as conversions to defense production are completed. Present lull in market has allowed most foundries and some steel plants to better their inventory positions slightly.

Chicago — Although demand for pig iron exceeds supply by a good margin a certain spottiness is developing in both captive and jobbing foundries. In case of gray iron shops, falling off of household appliance volume and lack of offsetting defense orders is responsible.

Seattle — Foundry operations are active. Due to scarcity of pig iron, percentage of foundry scrap consumed has risen markedly. Domestic pig iron is practically unobtainable. Agencies for foreign producers are taking tentative orders, subject to confirmation, and based on slow delivery, six months or more.

Scrap . . .

Scrap Prices, Page 130

Washington — Scrap dealers are being mobilized by the Institute of Scrap Iron & Steel to promote the 3-pronged salvage drive being conducted by the steel, foundry, and scrap industries and the government. The Institute has nominated dealers in leading cities to represent the scrap industry on local scrap mobilization committees.

Farm scrap drive gets under way Oct. 15. Farmers will be urged to bring in their scrap and sell it to the local dealer.

Pittsburgh—Delivered price of iron and steel scrap will go up when the freight rate increase of 9 per cent becomes effective Aug. 28. Nine per cent figure includes the previous 4 per cent increase. Pittsburgh relies on outside shipments of scrap to considerable extent. New rates will mean 55 to 60-cent increases on eastern and New England scrap and may run as high as 75 cents on southwestern scrap.

Boston—Slight improvement in deliveries of heavy melting steel is attributed to initial results of the drive for dormant tonnage moving through dealers. With steelmaking operations high, however, mill inventories are building slowly. Shortage tends to encourage upgrading, and consumers are being forced to go farther afield for tonnage. Most steel scrap is moving from the Boston area at $34.17 f.o.b., with the water rate at Providence $36.25. Consumers of cast are not so badly off as regards supplies and are holding incoming shipments more closely to specifications.

New York — With the increase in freight charges scheduled for Aug. 28, up to consumers for absorption, various scrap buyers in this district have been stepping up their specifications recently. The increase in freight charges will be up 5 per cent from those now in effect and 9 per cent from those in effect Apr. 3, this year, just prior to the current interim increase.

Philadelphia—Scrap consumers are maintaining inventories, although the situation is very tight, notably in steel grades. One indication of a slightly more comfortable situation in steel scrap is the lack of further allocations.

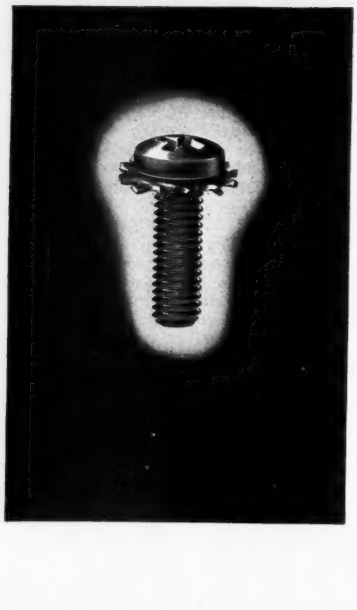
Cleveland — Consumers describe scrap supply outlook for the winter as "bleak." Tonnage of "home" scrap plus receipts of purchased scrap, much of which is being received on allocation, is sufficient to cover only immediate needs. If distribution is maintained on an equitable basis, mills may be able to maintain operations with a minimum of shutdowns. However, several mills in Ohio are down to less than one week's supply.

Detroit — Dullness of foundry scrap demand is expected to continue. Many melters are shunning everything except clean auto cast. Open hearth scrap, however, is in strong demand and no accumulation is being made at any mills.

Cincinnati—Industrial scrap is coming out more freely but total movement fails to solve problems of mills trying to bolster stocks in anticipation of winter needs.

Chicago — Steelmaking scrap situation has improved moderately here the past week or two and some inventory pickup has resulted. The margin, however, is so small that it builds no hope against the widespread fears of critical shortage next winter.

St. Louis—Scrap buying by brokers for mills perked up sharply last week as remote sources began coming through with shipments. One broker said purchases were up 100 per cent over the previous two weeks. Mills,



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down to 30 days or less supply are taking all they can get.

Seattle — Steel scrap receipts are fairly large but they are insufficient to increase inventories. Prospects for the winter are unfavorable. Bethlehem Pacific Coast Steel Co. received its first shipment of 2000 tons from Nome, Alaska, an area heretofore out of range.

Iron Ore . . .

Iron Ore Prices, Page 129

Cleveland — Consumption of Lake Superior iron ore holds at high rate, although furnaces closing for repairs are more numerous than earlier in the year. On Aug. 1, seven furnaces were idle compared with only two July 1, 177 and 182 furnaces being in blast on those respective dates.

Total ore consumption was 7,555,898 tons in July compared with 7,499,475 tons in June and 7,579,251 tons in July, 1950. This brought the cumulative total for the first seven months to 51,185,226 tons compared with 47,425,250 tons in the like 1950 period.

In line with prospects for heavy demand through the winter stocks are being accumulated at furnaces and Lake Erie docks. The total on Aug. 1 came to 33,141,828 tons, increase of 6,719,185 tons for the month and gain of 9,033,954 over the total on the same date a year ago.

Shipments from upper lake ports amounted to 3,048,697 tons during the week ended Aug. 20 compared with 3,175,939 tons the preceding week and 2,819,554 tons for the like week a year ago. This brought cumulative shipments for the season to date to 54,073,126 tons compared with only 42,025,014 the like 1950 period. The season increase for United States ports alone this year is 11,768,938 tons.

Canada . . .

Toronto, Ont. — Steel supply remains tight with no indication of easing through remainder of the year. Defense programs are not taking as much steel as expected, but increased tonnages on this account will be required before year-end.

Increased production from domestic mills together with imports have tended to bring relief to Canadian steel consumers. However, consumers face substantially higher prices for European steel. It recently was announced British steel prices are advancing up to 26 per cent.

STRUCTURAL SHAPES . . .

STRUCTURAL STEEL PLACED

5000 tons, nylon plant, Pensacola, Fla., to Bethlehem Fabricators Inc., Bethlehem, Pa.

4880 tons, Gilmore street bridge, Jacksonville, Fla., to Allied Structural Steel Companies, Chicago.

3300 tons, plant, Bulova Watch Co., Queens, New York, to Bethlehem Fabricators Inc., Bethlehem, Pa.

2200 tons, state bridge, Montgomery county, Pennsylvania, to American Bridge Co., Pittsburgh.

1060 tons, state bridges, Leominster, Mass., to Bethlehem Steel Co., Bethlehem, Pa., through Bayer & Mingolla Construction Co., Worcester, general contractor.

1035 tons, Green Bus garage, Queens, New York, to Simmons Holland Co., that city.

1000 tons or more, 24 crest gates, Rock Island power plant addition, Washington state, to Consolidated Western Steel Corp., Seattle, low, $1,413,000.

575 tons, Muhlenberg hospital addition, Plainfield, N. J., to Bethlehem Contracting Co., Bethlehem, Pa.

540 tons, state bridge, Route 26, section 2B, New Jersey, to American Bridge Co., Pittsburgh.

525 tons, towers, Niagara Mohawk Power Corp., Albany, N. Y., to Lehigh Structural Steel Co., Allentown, Pa.

305 tons, administration building, The Texas Co., Beacon, N. Y., to Bethlehem Steel Co.

500 tons or more, spillway gates and leaves, McNary dam, to Gunderson Bros. Engineering Corp., low $1,566,354.

288 tons, outside facilities Eielson air field, Alaska, to Century Metal Works, Seattle; Lytle-Green Co., Seattle, general contractor.

230 tons, substation construction for Bonneville Power Administration, to Bethlehem Pacific Coast Steel Corp., Seattle.

120 tons, galvanized, addition to Rock Island power plant, Washington state, to Bethlehem Pacific Coast Steel Corp., Seattle.

100 tons or more, two intake gates and frames, Ross dam project, negotiated contract with Seattle light department, $627,413, to Todd Shipyard Corp., Seattle.

STRUCTURAL STEEL PENDING

3000 tons, warehouse buildings, United States Corps of Engineers, New Cumberland, Pa.; bids Sept. 5.

1400 tons, Eklutna, Alaska, power plant tunnel; rebids to Bureau of Reclamation, Denver, Sept. 11.

588 tons, state bridge, Trenton, N. J.; bids Sept. 5.

335 tons, state bridge work, Lackawanna and Wyoming counties, Pennsylvania; bids Sept. 7.

300 tons, Army power house, Whittier, Alaska; Haddock Engineers, Seattle, low on rebid.

250 tons, fenders, Delaware River Memorial bridge, near Wilmington, Del.; Merritt-Chapman & Scott, New York, awarded general contract.

200 tons, automotive maintenance shop, United States Corps of Engineers, Metuchen, N. J.; bids Sept. 6.

150 tons (shapes 80 tons and bars 70 tons), plate girder bridge, East Hartford, Conn.; bids in.

120 tons, state bridge, Cambria county, Pennsylvania; bids Sept. 7.

Unstated, 16-story teaching hospital, University of Oregon, Portland; plans in preparation.

Unstated, gate frames, guides, etc., Ferry dam, Montana; bids to Bureau of Reclamation, Denver, Sept. 4.

Unstated, cold storage structure, motor repair shop, two warehouses, Yakima, Wash., training center; bids in to U. S. Engineer, Seattle, Aug. 24.

REINFORCING BARS . . .

REINFORCING BARS PLACED

2300 tons, outside utilities Ladd Field, Alaska, to Bethlehem Pacific Coast Steel Corp., Seattle; Peter Kiewit Sons Co., Seattle, general contractor.

1300 tons, outside utilities, Eielson Field, Alaska, to Bethlehem Pacific Coast Steel Corp., Seattle; Lytle-Green Co., Seattle, general contractor.

1100 tons, jet engine plant, Westinghouse Electric Corp., Cleveland, to Truscon Steel Co., Youngstown.

1000 tons, jet engine plant, General Electric Co., Louisville, Ky., to Bethlehem Steel Co.

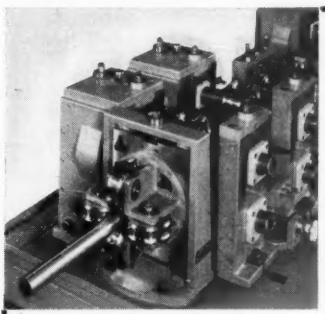
450 tons, addition to Washington state school, Buckley, to Bethlehem Pacific Coast Steel Corp., Seattle; MacDonald Building Co., Tacoma, general contractor.

300 tons, new plant, Allis-Chalmers Mfg. Co., Terre Haute, Ind., to Truscon Steel Co., Youngstown.

270 tons, sewage plant, Fostoria, O., to Truscon Steel Co., Youngstown.

259 tons, main library, Tacoma, to J. D. English Steel Co., Tacoma.

150 tons, office and operating building, Elgin,



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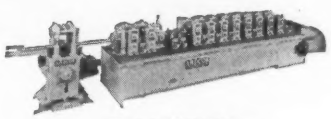

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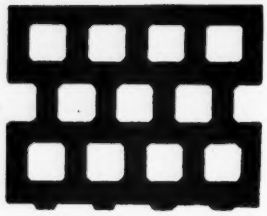

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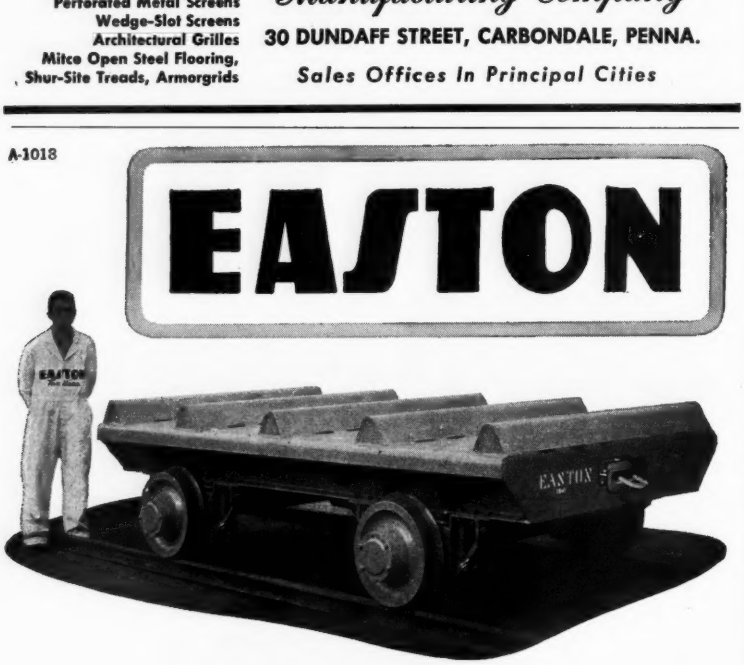

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140 tons, water works, Mt. Vernon, O., to Pollock Steel Co., Cincinnati.
130 tons, bridge, White Bear, Minn., to United States Steel Supply Co., Chicago.
100 tons, Washington state Vesta highway bridge, to Bethlehem Pacific Coast Steel Co., Seattle; Bennett & Campbell, general contractor.

REINFORCING BARS PENDING

5000 tons, rebids Eklutna power plant project tunnel, Alaska; rebids to Bureau of Reclamation, Denver, Sept. 11.
1500 tons, Chrysler Corp., Detroit.
700 tons, Elmendorf air field barracks, Alaska; bids in to U. S. Engineer, Seattle, Aug. 24.
480 tons, laterals, etc., Columbia Basin project; specifications out.
300 tons, piers and approaches, Kennewick-Pasco Washington state bridge; Paul Jarvis Inc., Seattle, low $1,917,000.
300 tons, Babcock pumping plant, Columbia Basin project; bids to Bureau of Reclamation, Ephrata, Wash., Sept. 18.
260 tons, state bridge, Trenton, N. J.; bids Sept. 5.
250 tons, Potholes canal section, Columbia Basin project; Peter Kiewit Sons Co., Seattle, low $1,357,965.
245 tons, state highway bridges, Leominster-Lancaster, Mass.; Bayer & Mingolla Construction Co. Inc., Worcester, Mass., low.
105 tons, state bridge work, Lackawanna and Wyoming counties, Pennsylvania; bids Sept. 7.
100 tons, state bridge work, Luzerne county, Pennsylvania; bids Sept. 7.
100 tons, outside facilities Elmendorf air field, Alaska; general contract to S. Birch & Sons, Seattle.
Unstated, approaches Columbia river bridge; bids in to Port of Hood River, Hood River, Oreg., Aug. 24.
Unstated, foundations for Alcoa plant, Malaga, Wash., to Donald M. Drake, Portland, Oreg.
Unstated, 11-story apartment, Fairbanks, Alaska; general contract to S. S. Mullen, Seattle.
Unstated, Army facilities, Fairbanks, Alaska; Kuney-Johnson Co., Seattle, low, $1,069,000.

PLATES . . .

PLATES PENDING

1400 tons, Eklutna power plant tunnel project, Alaska; rebids to Bureau of Reclamation, Denver, Sept. 11.
100 tons or more, 400,000-gallon double ellipsoidal water tank and tower, state hospital, Winslow township, New Jersey; bids in to director, division of purchase and property, Trenton, N. J.
Unstated, 22 oil storage tanks; bids in to Bonneville Power Administration, Portland, Oreg., Aug. 20.

PIPE . . .

CAST IRON PIPE PLACED

250 tons, 6-inch cast iron pipe for Portland, Oreg., to H. G. Purcell, Seattle, for U. S. Pipe & Foundry Co., Burlington, N. J.

CAST IRON PIPE PENDING

Unstated, 1600 feet 8 inch cast iron pipe and 6000 feet 10 inch steel water mains; bids in to Vancouver, Wash., Aug. 14.
Unstated, 2000 feet or more, 42 and 30 inch cast iron pipe, for disposal project; bids to Portland, Oreg., Sept. 6.
Unstated, 9000 feet 16 to 6 inch water mains; bids to Alaska Public Works, Juneau, Alaska, Sept. 12; for Anchorage water system.

RAILS, CARS . . .

RAILROAD CARS PLACED

Denver & Rio Grande Western, 25 seventy-ton covered hopper cars, to Pullman-Standard Car Mfg. Co., Chicago.
Detroit, Toledo & Ironton, 100 seventy-ton covered hopper cars, to American Car & Foundry Co., New York.
Macon, Dublin & Savannah, two caboose cars, to International Railway Car & Equipment Mfg. Co.
Tennessee Central, 200 fifty-ton hopper cars, to Pullman-Standard Car Mfg. Co., Chicago.

Metalworking Briefs . . .

CONSTRUCTION—ENTERPRISE—ORGANIZATIONAL CHANGES

Retools to Make Armor Plate

Retooling of the plant of Metal Fabricating Co., a subsidiary of Detroit-Michigan Stove Co., Detroit, for production of armor plate will be completed by Oct. 1. The plant, located at 6450 E. McNichols Rd., produced more than 20 million pounds of armor plate for the armed services in World War II. The company's output of gas cooking equipment will be continued.

Plans $1 Million Foundry

American Brake Shoe Co., New York, will erect a foundry on the outskirts of Medina, N. Y. Initial unit of the $1 million structure will have 75,000 square feet of floor space. The foundry will be ready for operation in the spring and will produce jet engine parts.

Wellman Buys Anker-Holth

Wellman Engineering Co., Cleveland, purchased the Anker-Holth Mfg. Co., Port Huron, Mich. Anker-Holth manufactures hydraulic and air-operated cylinders, chucks and rotating cylinders, air valves and accessories. It will be operated as Anker-Holth Division, Wellman Engineering Co.

Stromberg-Carlson Expands

Stromberg-Carlson Co., Rochester, N. Y., leased the former Menihan Shoe Co. plant in that city and plans to use it for light manufacturing, assembly work and storage.

Moves Cincinnati Office

Independent Pneumatic Tool Co., Aurora, Ill., manufacturer of portable power tools, transferred its Cincinnati branch to 3726 Floral Ave. The new headquarters, under management of H. C. Brown, offers factory branch service facilities.

Builds Cold-Drawn Wire Mill

Crucible Steel Co. of America, New York, is building a $3 million cold-drawn wire mill at its Sanderson-Halcomb Works, Syracuse. The mill will be adjacent to the company's existing wire mill.

Republic Aviation Expanding

Republic Aviation Corp. is expanding production and research facilities at its jet airplane factory in Farmingdale, L. I. This is the major part of a building program estimated to cost $1.5 million. Construction is scheduled to be completed early in 1952. Included in the project is modification of a hangar building to allow the installation of foundry equipment.

Burke Steel Plans Expansion

Burke Steel Co., Rochester, N. Y., plans a $253,779 expansion project at its plant. The firm produces steel forgings.

Will Build Jet Engine Parts

Plans for use of the newly-built plant on Thompson road, Syracuse, N. Y., for production of parts for General Electric jet engines were disclosed by Cloud Wampler, president, Carrier Corp., which will operate the plant.

Bonner Machine Works Moves

Bonner Machine Works Inc. moved from El Segundo, Calif., to a new plant in the Los Angeles international airport industrial tract. Total investment of $200,000 for land, building and new equipment is represented in the new plant.

Jackson Buys Dempsey Pump

Byron Jackson Co., Los Angeles, added a new oil well pump to its line through the purchase of Dempsey Pump Co., Tulsa, Okla. The Dempsey Tulsa plant will be under direction of V. C. Horner of the Byron firm, but no other personnel changes are contemplated, says E. S. Dulin, president, Byron Jackson Co.

Pax Metal Builds Plant

Pax Metal Corp., Los Angeles, is building a plant at 14533 Keswick St., Van Nuys, Calif., to produce aluminum extrusions and shapes.

Marlin-Rockwell May Expand

Marlin - Rockwell Corp., Jamestown, N. Y., acquired 131 acres of land in Ellicott and Poland townships, to be used for future expansion. The firm will expand if and when increased quantities of bearings are required in the defense program.

Coke Oven Contract Placed

United States Steel Co. awarded Koppers Co. Inc., both of Pittsburgh, a contract for engineering and construction of three new batteries of chemical-recovery coke ovens, each comprised of 61 ovens. The ovens will be constructed at U. S. Steel's Clairton, Pa., Works, replacing three old batteries which have been in use for many years. They

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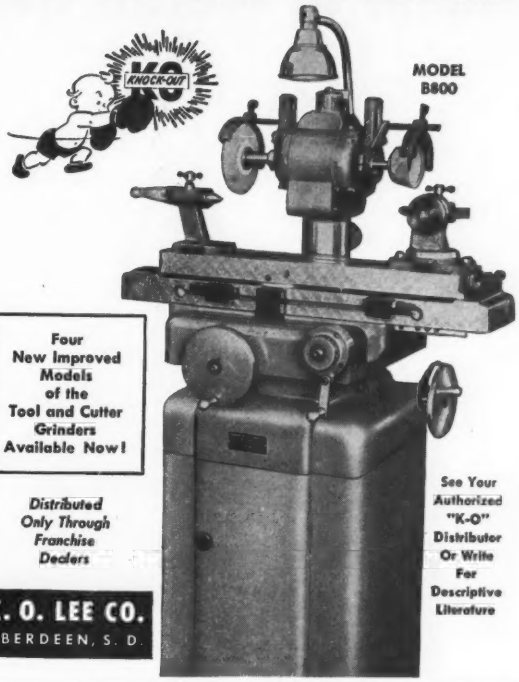

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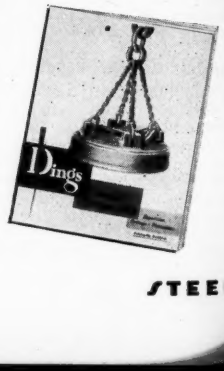

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Parker Aircraft Co. Formed

As a result of expanded operations of the Pacific Division plants at Los Angeles of Parker Appliance Co., Cleveland, the division has been incorporated as the Parker Aircraft Co., a wholly-owned subsidiary of the parent company.

Pekay Opens Detroit Office

Pekay Machine & Engineering Co., manufacturer of foundry sand handling and conditioning equipment and elevator buckets, with main plant and offices in Chicago, opened a sales service and engineering office at 13720 Puritan Ave., Detroit 27.

Haiss Mfg. Moves to Rome

Pettibone-Mulliken Corp., Chicago, will move the plant of George Haiss Mfg. Co., a subsidiary located in the Bronx, N. Y., to the Rome Grader Division, Rome, N.Y. The Haiss company makes loading equipment.

Increases Laboratory Space

Pittsburgh Coke & Chemical Co., Pittsburgh, completed the first major unit of its new central research laboratories at Neville Island, Pa. The unit more than doubles the company's available laboratory space and centralizes a number of research groups previously located at a number of different points on Neville Island.

Atlantic Steel Expanding

Atlantic Steel Co., Atlanta, broke ground earlier this month for the first phase of a multimillion dollar expansion program. The first unit will be an electric furnace with an annual capacity of 100,000 tons of steel, scheduled to be in operation by February. This furnace will supplement the company's three present openhearth furnaces and will increase Atlantic Steel's annual capacity by 50 per cent, to 300,000 tons. The building will be fabricated and erected by Bethlehem Steel Co. The 60-ton furnace is being constructed by Pittsburgh Lectromelt Furnace Corp. and will be the largest in the southeast.

Aircraft Tapered Sheets Inc.

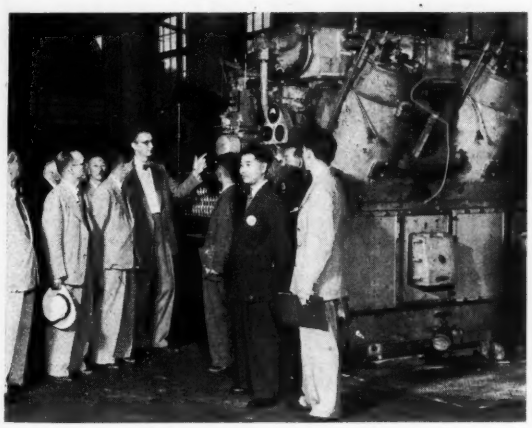
Aircraft Tapered Sheets Inc., Los Angeles, opened a third plant in Burbank, Calif., to specialize in aircraft spar machining. Equipment and machinery assigned by the U. S. Air Force Industrial Reserve Pool under an Air Force facilities contract includes six aircraft spar milling machines.

GM May Build in Texas

Buick - Oldsmobile - Pontiac Assembly Division, General Motors Corp., Detroit, acquired a 255-acre site at the eastern edge of Arlington, Tex., between Fort Worth and Dallas, for a possible future manufacturing or assembly operation.

Turco To Market Dy-Check

Turco Products Inc., Los Angeles, will manufacture and market the Dy-Chek dye penetrant inspection process developed by Northrop Aircraft Inc., Haw-



TIP ON THE TYPICAL: E. C. Phelps, assistant works manager of Cooper-Bessemer Corp., Mt. Vernon, O., points out the type of gas engine compressor built in "a typical small American city" to members of the Japanese Diet who will later sit in on the San Francisco Peace Conference

Hyde Park

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thorne, Calif. Turco plans to manufacture Dy-Chek materials at its main plant in Los Angeles and at its branch factories at Houston, Chicago, and Newark, N. J. The Dy-Chek process indicates cracks or flaws in metal by causing cracks or other openings to "bleed" in scarlet lines which emerge with photographic clarity against a white background.

Buys Fire Engine Business

Ahrens-Fox Fire Engine Division, Cleveland Automatic Machine Co., Norwood, O., was acquired by General Truck Sales Inc., Cincinnati. Equipment of the division will be moved to the latter city. Plans call for manufacture of fire-fighting apparatus for installation on commercial truck chassis.

Hitchiner Mfg. Co. To Move

Hitchiner Mfg. Co. Inc. will move from its plant in Manchester, N. H., to a new and larger factory in Milford, N. H. The company makes precision investment castings.

Olsco Mfg. Changes Hands

Garrett Oil Tools, Houston, purchased Olsco Mfg. Co., Longview, Tex., for an amount in excess of $1 million. The Longview plant will continue to make an artificial lift tool for oil wells.

Buys Smith Incubator Co.

Trescott Co., Fairport, N. Y., producer of fruit packing house equipment, purchased Smith Incubator Co., Cleveland, and will move the business to Fairport.

Will Develop Property

Horseheads Holding Center Corp. purchased the former Horseheads Holding Point, Horseheads, N. Y., for $2,650,000, and plans extensive development of the group of buildings to make them suitable for manufacturing as well as warehousing.

Tom M. Girdler Christened

First of several C4 type ocean going vessels being converted to Great Lakes freighters was christened in Baltimore Aug. 16. Mrs. Tom M. Girdler, wife of the chairman of the board of Republic Steel Corp., christened the ship the *Tom M. Girdler*. Conversion of the ship, part of which will take place in Great Lakes yards, will be completed in time for the vessel to enter the lake ore carrying service this season. She is the property of Nicholson Universal Steamship Co., Detroit, in which Republic is owner of a 70 per cent interest. The conversion, costing in excess of $2 million, will provide a ship with an ore carrying capacity of about 14,500 tons. Overall length of the ship is 600 feet with a 71 foot 6 inch beam. *Tom M. Girdler* is expected to make the round trip between Cleveland and Duluth in 4½ to 5 days.

Emerol To Build Factory

Emerol Mfg. Co., New York, plans the erection in Arlington Heights, Ill., of a factory building, including offices, to cost about $200,000. The company makes lubricating oils and greases.

British-American Carbon

Great Lakes Carbon Corp., New York, and Powell Duffryn Carbon Products Ltd., Hayes, Middlesex, England, entered into an agreement under which a jointly owned company, British-American Carbon Corp., 18 E. 48th St., New York, was formed to manufacture and sell a wide range of carbon and graphite products. William J. Crawford is president of the new company.

Opens Plymouth Plant Sept. 1

Barnes - Gibson - Raymond Division, Associated Spring Corp., Bristol, Conn., will open its new plant in Plymouth, Mich., Sept. 1. The plant, located at 40300 Plymouth Rd., takes over the operations of its former Detroit plant, manufacturing mechanical springs, wire forms, and small stampings. Business continues as usual at the division's Cook plant in Ann Arbor, Mich. Fuller F. Barnes is president of Associated Spring Corp. N. Mark Purple is manager of Barnes-Gibson-Raymond Division.

Firms Chartered in Delaware

Secretary of state's office, Dover, Del., chartered: Parva Buckle Co., machinery, with U. S. Corporation Co., Dover, serving as principal office; Alko Corp., machinery, with Corporation Guarantee & Trust Co., Wilmington, Del., serving as principal office; Rockport Trading Corp., metals, and Irwin Tool Co. Inc., metal products, with Prentice-Hall Corporation System Inc., Dover, serving as principal office; Terminal Metal Products Co. Inc., metal products, and First Eastern Corp., steel mills, with Colonial Charter Co., Wilmington, serving as principal office; Keystone Metal Co. of Alabama, metal products, Seaboard Machinery Corp., machinery, Brownthorn Electronics Inc., machinery, and Manganese Inc., metals, with Corporation Trust Co., Wilmington, serving as principal office.

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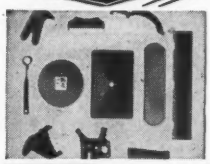

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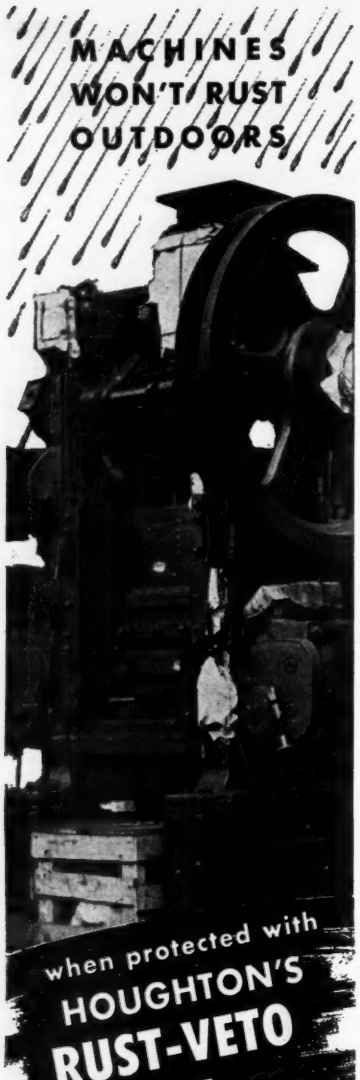

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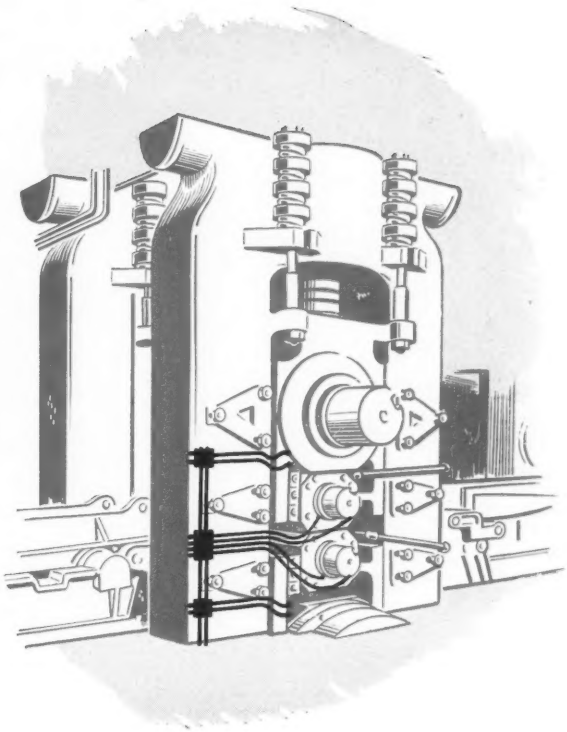

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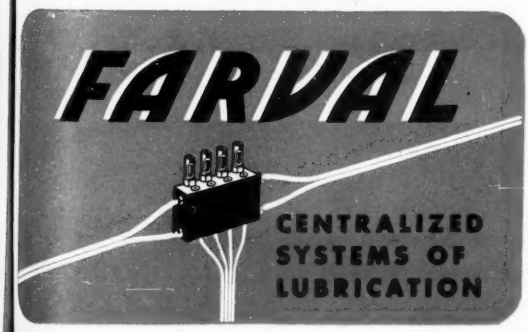

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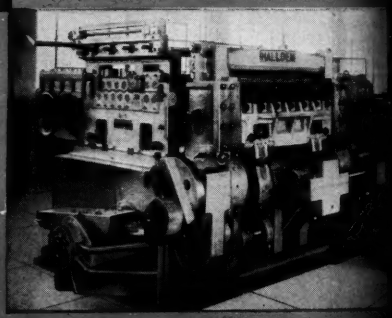

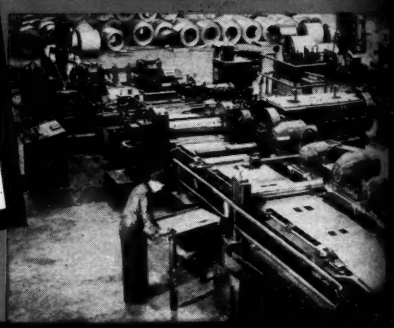

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